



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>



600048529Y



PART I.

95.
- Price Sixpence.

THEORETICAL ASTRONOMY

EXAMINED AND EXPOSED:

By "COMMON SENSE."

ON THE MOVEMENT OF THE SOLAR SYSTEM IN SPACE.

"The matter is left in a most delightful state of uncertainty, and I shall be very glad if any one can help us out of it."—PROF. AIRY, Astronomer Royal.

CONTENTS.

The "Exact" Science of Astronomy....Sun's Distance varied from three-and-a-half Millions to a hundred and four Millions of Miles! ...The Velocity of Light...The Daily Telegraph and the Greenwich Astronomer....Astronomers' "Corrections"....Rev. C. Pritchard's advice ...Sound versus Sense...Mr. Hind's version,—122,000,000 of Miles cut off Neptune's Distance, at one stroke!...Chambers's Information... No "round world" spoken of in the Bible... "Parallax"...The Rev. R. Main's "Proofs"...Suppositions are not Proofs...Perspective...Dr. Lardner and "The Planet"...Dr. Lardner's Concave Convexity!... Astronomical Observation proving that the Earth is inhabited!...Mr. Glaisher's Balloon "Observation," a flat Contradiction... R. Burchett, Esq. on the View from a Balloon, &c....Lord Brougham and Sir D. Brewster on Astronomy:—"The Great Book of Nature Sealed!"... The Rev. D. Olmsted:—his ingenuity!...The "Spherical Loadstone"... Supposition and Delusion.

Dedicated to "PARALLAX,"

Author of Zetetic Astronomy, &c.

LONDON:

F. PITMAN, 20, PATERNOSTER ROW, E. C.

18422. 2. 5

THE UNIVERSITY OF CHICAGO PRESS

JANUARY 1901

THE UNIVERSITY OF CHICAGO PRESS

THE UNIVERSITY OF CHICAGO PRESS

THE UNIVERSITY OF CHICAGO PRESS

THE UNIVERSITY OF CHICAGO PRESS

THE UNIVERSITY OF CHICAGO PRESS

THE UNIVERSITY OF CHICAGO PRESS

THE UNIVERSITY OF CHICAGO PRESS

THE UNIVERSITY OF CHICAGO PRESS

THE UNIVERSITY OF CHICAGO PRESS

THE UNIVERSITY OF CHICAGO PRESS

THE UNIVERSITY OF CHICAGO PRESS

THE UNIVERSITY OF CHICAGO PRESS

THE UNIVERSITY OF CHICAGO PRESS

THE UNIVERSITY OF CHICAGO PRESS

THE UNIVERSITY OF CHICAGO PRESS

THE UNIVERSITY OF CHICAGO PRESS

ДЛЯ ПОСЛЕДОВАТЕЛЬНОГО УЧЕНИЯ

Содержание

1. Введение

2. Основы теории

3. Методы исследования

4. Результаты

5. Заключение

THE ZENITH SECTOR AND ITS APPLICATION.

These Sketches are taken from Professor Airy's "Six Lectures on Astronomy," and are plainly illustrative of the mode adopted by the Astronomer Royal to ascertain the Figure of the Earth.

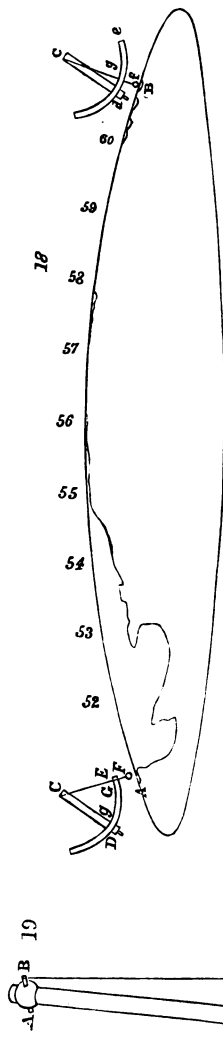


Figure of a portion of the Earth's surface from Shanklin, Isle of Wight, to Balta, Shetland Isles, on the "supposition" that the Earth is a globe. The telescope is directed to a star from Shanklin (A), and to the same star, from Balta (B). The difference between the angle formed by the telescope and plumb-line at Shanklin and at Balta is indicated; and the question is, Does the PLUMB-LINE shift its position, and thus prove the surface of the earth to be convex, or, does the TELESCOPE need to be shifted, thus proving the surface of the earth to be LEVEL?

Zenith Sector:

The Zenith Sector is fully described in pages 93 and 94 of "Theoretical Astronomy," and the complete Fallaciousness of the Arguments of the Astronomer Royal as to its use is shown in subsequent pages.

THEORETICAL ASTRONOMY EXAMINED AND EXPOSED

BY

“COMMON SENSE.”

*“Be just, and fear not :
Let all the ends thou aim’st at be thy country’s,
Thy God’s, and truth’s.”—SHAKESPEARE.*

LONDON :
JOB CAUDWELL, 335, STRAND, W.C.
GREENWICH :
WM. CARPENTER, SOUTH STREET, S.E.

LONDON:
PRINTED BY WILLIAM CARPENTER,
GREENWICH, S.E.

To
"P A R A L L A X,"
The Founder of Modern Zetetic Philosophy,
THIS VOLUME
Is Respectfully Dedicated
BY
The Author.

“Strike but Hear!”

PREFACE.

.....

JOHN STUART MILL, in his valuable work *On Liberty*, says this:—
“It is the fashion of the present time to disparage negative logic—that which points out weaknesses in theory or errors in practice, without establishing positive truths. Such negative criticism would indeed be poor enough as an ultimate result; but as a means to attaining any positive knowledge or conviction worthy the name, it cannot be valued too highly; and until people are again systematically trained to it, there will be few great thinkers, and a low general average of intellect, in any but the mathematical and physical departments of speculation. On any other subject, no one’s opinions deserve the name of knowledge, except so far as he has either had forced upon him by others, or gone through of himself, the same mental process which would have been required of him in carrying on an active controversy with opponents. That, therefore, which, when absent, it is so indispensable but so difficult to create, how worse than absurd it is to forego, when spontaneously offering itself! If there are any persons who contest a received opinion, or who will do so if law or opinion will let them, let us thank them for it, open our minds to listen to them, and rejoice that there is some one to do for us what we otherwise ought, if we have any regard for either the certainty or the vitality of our convictions, to do with much greater labour for ourselves.”

There are, truly, people who “contest” certain “received opinions;” and, people, also, who have great “regard” for the “vitality of their convictions.” “*Theoretical Astronomy Examined and Exposed*” is sent forth to the world by one of the former class, especially for those of the latter. But he who thus throws out his little book upon the turbulent waters of Literature—and who does so with the conviction that it will never sink—belongs to both of these classes: he regards the vitality of his convictions as of great moment—remembering that where there is no life there is no power. The author is convinced that mere “opinions” are of very little use in *Physics* or *Metaphysics*: and, that the chief aim should be to arrive at the *FACTS*. He desires the Reader to test his own convictions—to put a strain upon them—to try them as to their vitality; and, this done, to heap all the weight which will thus be gained upon those of “COMMON SENSE” as laid down in the book before him: recollecting that the more absurd or outrageous a man’s convictions may happen to be, with so much the greater ease can they be overthrown. If, then, thou be not a *Zetetic Philosopher* already—and be not fearful of the name, which only means One who ‘proves’ things, and ‘holds fast to the good,’—take this book, Reader: and, if thou canst not overthrow it, be content—nay, be “thankful”—to be overthrown by it: since no harm can possibly result from the adventure, but, it may be, that positive and well-grounded “convictions” shall take the place of mere baseless or ill-founded “opinions.”

“COMMON SENSE.”

Greenwich, London, S.E., June, 1866.

THEORETICAL ASTRONOMY EXAMINED AND EXPOSED.

OPINIONS OF THE PRESS.

THE Volume to which these Reviews are now prefixed originally appeared in Parts, each part comprising a Chapter. These were, in due course, forwarded to the Editors of the principal Metropolitan Newspapers and Magazines; and the following Opinions which soon afterwards appeared—and which are the whole of those which came under our notice—are given word for word as we find them. We give them a place, considering it to be possible that they may be interesting to those who wish to weigh the subject and to see at a glance what the people have presented to them for their edification. We beg leave to thank each Reviewer for his opinion of sundry Parts, and, also, to request the favour of a careful consideration of the subject in its more complete form.

PUBLIC OPINION, APRIL 23, 1864.

"Theoretical Astronomy Examined and Exposed. By 'Common Sense.' London: F. Pitman. — 'Common Sense' is smart at the expense of the modern astronomers, whose conflicting statements about the distance of the sun from the earth are so numerous. He ridicules modern astronomy, and caustically comments on the unreliable character of the views its professors advance for our guidance."

GREENWICH FREE PRESS, MAY 7, 1864.

"Theoretical Astronomy Examined and Exposed: by COMMON SENSE. Dedicated to 'Parallax.' London: F. Pitman, 20, Paternoster Row. Price Sixpence. The author of this clever pamphlet is well known to our readers. It has been said by many, 'How is it that Professor Airy and his galaxy of assistants have never attempted to answer this pungent pamphlet, especially as the author is a native of Greenwich, and lives within a few hundred yards of Flamstead House!' 'Common Sense' argues his position in a very able manner: the highest authorities are quoted, and, to our minds, demolished like a pack of cards. We do not commit ourselves to every statement our author makes: but justice compels us to say, his remarks on the views propounded by the Astronomer Royal, 'Daily Telegraph,' Rev. C. Pritchard, Rev. R. Main, Dr. Lardner, Mr. Glaisher, Mr. Burchett, Lord Brougham, Sir D. Brewster, Rev. D. Olmstead, are telling in the extreme: while the crude and uncertain statements made by the professors of the 'exact' science of Astronomy, are shattered to the winds by the author's powerful pen. The book is beautifully printed, and will no doubt command a large circulation, in these days of free enquiry."

THE NEWS OF THE WORLD, MAY 8, 1864.

"Theoretical Astronomy Examined and Exposed. By 'Common Sense.' Part I. [Pitman.] This is a novel and curious attempt to show that astronomers are all wrong, not only in their calculations of distances, but also about the shape of the earth; and it will obtain the notice which all such curious attempts engage. The author takes great pains to show that he is right; and his readers will admire, at least, his own confidence in the new theory which he promulgates, and the vigorous manner of his onslaught upon the astronomers."

THE ILLUSTRATED LONDON NEWS, MAY 28, 1864.

"A pamphlet by a Protestant divine has lately been issued, in which the Cardinal might find some comfort. It is termed 'Theoretical Astronomy Examined and Exposed,' and it insists that Astronomy is no exact science, because the sun's distance varies in astronomical calculation from three millions and a half, to four hundred millions of miles, and that 122,000,000 miles have been cut off Neptune's distance at one stroke! Emboldened by these little facts, the author cites Messrs. Glaisher and Burchett to prove that, judging from a balloon view, the earth is flat, and, by an ingenious reading of perspective, determines that the distant view of ships at sea does not prove the earth's rotundity. Nor, says he, does our planet—which, in fact, is NOT a planet—move round the sun. The sun moves; Galileo was wrong; Copernicus a driveller. The earth is a huge, flat plain, over the edge of which any one may peep. The stars and the moon are merely its lights; the sun travels over it, but what he does to get back to the east every morning, and how the calculation of eclipses and the rotation of the seasons in a system of Astronomy which is all a supposition and a delusion happen to be right, it is hard to say."

THE FAMILY HERALD, JUNE 25, 1864.

"SPHEROID sends us the first part of a book called *Theoretical Astronomy*, in which the modern science of Astronomy is utterly turned upside down. Here is some portion of his book:—"Since Copernicus lived, 'followers' have feasted and revelled upon the strength of the poor old man's legacy. We—the people—are taught that Astronomy is an exact science! Let us be certain. Copernicus computed the distance of the sun from us to be 3,391,200 miles; Kepler reckoned it to be 12,376,800 miles; Ricciola, 27,360,000 miles; Newton said it did not matter whether we reckoned it 23 or 54 millions of miles, for he said that *either* would do well; Benjamin Martin, in his *Introduction to the Newtonian Philosophy*, in 1754, says that its distance is between 81 and 82 millions of miles; fifty years ago, schoolboys were taught that it was just 81 millions; in *Orr's Circle of the Sciences*, Mr. Breen says that it is more than 82 and a half millions; in 1784, Thomas Dilworth says 93,726,900; modern school-books, over which children now spend their playful energies and enfeeble their bodies, give us the distance as 95,000,000 of miles; Mr. Hind has stated that, positively, it is 95,298,260; and, according to a writer in the *Telegraph* of November the 30th, 1863, Gillies and Gould state that it is more than 96 millions, and Mayer, more than 104 millions of miles! So much for 'Knowledge' falsely so called." The author then endeavours to prove the round world flat; the stars not planets but lights; the sun goes round—or, he should say, under and over—the earth; and that astronomers are donkeys and not clever men. His suggestion about the rotundity of the earth being scarce proved by the apparent convexity of the sea, is skilful, and shows much thought; but what does he say to the other proofs of the rotundity of the earth, especially that one which is, we think, not unimportant,—the circular shadow cast by the earth on the moon during the eclipse of the latter? How is it again, if the principles of Geodesy be altogether wrong, that calculation of eclipses is perfect to the second, and that these eclipses may be calculated for twenty or a hundred years forwards or reckoned backwards? We quite agree with SPHEROID when he blames knowledge, "falsely so called," and we partly agree with Cardinal Wiseman when he tells us that Science will have to restudy her deductions, and will have to make them more consonant with the Word of God. We also may be obliged to make our interpretation of that sacred volume more consonant with Science, Charity, and Truth."

THE SPIRITUAL TIMES, AUGUST 6, 1864.

"Theoretical Astronomy, by COMMON SENSE. (F. Pitman.) We have the first two parts. They are full of striking arguments, and not a few ideas that cause us to ask ourselves—do we stand on our head or feet? The modern ideas of astronomy are critically examined, and would appear to be found wanting—but as we are not sufficiently enlightened in Astronomical knowledge to judge the matter fairly, we can only recommend a perusal of the numbers as they appear.

THE LONDON READER, AUGUST 20, 1864.

"Theoretical Astronomy Examined and Exposed. By 'Common Sense.' Parts I. and II. London: F. PITMAN.—There is no doubt that, in the ordinary affairs of the world, common sense is the one quality chiefly needed; but it is, unfortunately, as rare as it is desirable. If people were only endowed with common sense, say philosophers, what a world it would be! How merrily this good old globe would spin through space and circle through the spheres! But stay—here is a philosopher—an astronomical philosopher—the author writing under the pseudonym above—who states solemnly that the world is *not* round, and that it does not move through space at all. According to the dictum of 'Common Sense,' the so-called exact science of astronomy, as at present understood, is all wrong, and astronomers, one and all, are mad as March hares. There is no truth in their science, and no science in themselves; and 'Common Sense' tells them so flatly, and in good set phrase. They are men before their age—that is to say, they should have lived in the times of Ptolemy, and taught the Ptolemaic theory of the stars. That is what 'Common Sense' proposes, as far as we can discover; for he utterly renounces—we had almost written denounces—Copernicus and Galileo, and will have nought to do with their astronomical dicta; and, as for the 'lesser lights' of the science, Herschel and Hind, the astronomer royal himself, and all other astronomers whomsoever, why, Hanwell is the only fitting place for them. Our author proclaims aloud that they are false teachers, every man of them, and looks hopefully for the time when the doctrine they propound 'will be saluted by the people at large as the most stupendous absurdity that ever entered the mind of man.' There is no certainty as to what will or will not happen; still, we venture to say that we doubt the arrival of this period; and, meanwhile, we feel pretty sure that 'the people at large' will believe in Galileo and his disciples, and exclaim, as the great astronomer did, when carried, bruised and bleeding, from the rack, for daring to publish the theory of the earth's rotation, 'E pur ce, muove!'—it moves, nevertheless."

THE MORNING ADVERTISER, JANUARY 21, 1865.

"Theoretical Astronomy Examined and Exposed. By 'COMMON SENSE.' Parts I., II., and III.—London: Job Candwell, Strand. SINCE conviction earnestly urged, and resulting not from hasty prejudices or unreasoning obstinacy, but from a peculiar and exceptional mental bias, is deserving of respect and consideration, not the contempt and ridicule which is too often its fate. We had all thought that the system of Copernicus, and the discoveries of Galileo, Tycho Brahe, and Newton, were received as matters no longer to be discussed, much less disputed. Here we have, however, no brainsick speculator or rapt stargazer, but a sane, sober, hard-thinking, reasoning, well-informed man, adducing arguments, aye, and plausible arguments too, to show that the world is a plane surface, and not a globe, as man and youth have been taught; that the sun goes round, or rather over and under, the earth; in short, that error and delusion have blinded the mental vision of the scientific men whom we have worshipped with unreasoning idolatry. Pope said—

"Nature and nature's laws lay hid in night—

God said, 'Let Newton be, and all was light.'"

"The little Queen Anne's man" it seems was woefully misled, and the millions of Europe, Asia, Africa, and America, have been equally bamboozled. The writer, who has adopted the pseudonyme "Common Sense," displays certainly uncommon ability in support of his thesis—or skill in riding his hobby, as it may be more properly termed. "Common Sense" proposes as his axiom of investigation Dr. Beattie's axiom, "When men are once satisfied to take things as they find them; when they believe Nature upon her bare declaration, without suspecting her of any design to impose upon them; when their utmost ambition is to be her servants and interpreters; then, and not until then, will philosophy prosper." Our author next appeals, certainly rather to our "senses" than to our "sense," as to whether the earth is round. He arrives at the conclusion of Byron's excellent "Commander of the Faithful," and lord of the unfaithful Gulbeyaz, who was—

"Sure the moon was round,

And also was convinced the earth was square,

For he had travelled sixty miles, and found

No sign that it was circular anywhere."

"Our author, however, is not to be classed with the ignorant—far from it. He has examined, weighed, and considered all the "proofs" of the astronomers, and, by his balance, "found them wanting." Whether he will find others to approve of his balance, or able to see through his spectacles, is another question. He puts his case ingeniously. One little point amused us, and though it does not convince us of the earth's flatness any more than of its actual concavity, suggests a reflection that may serve to humble a too arrogant assumption of facts admitted without enquiry.

"Another curious effect of the aerial ascent was, that the Earth, when we were "at our greatest altitude, positively appeared concave, looking like a huge dark bowl, "rather than the convex sphere such as we naturally expect to see it. . . . The horizon "always appears to be on a level with our eye, and seems to rise as we rise, until at "length the elevation of the circular boundary of the sight becomes so marked that the "earth assumes the anomalous appearance, as we have said, of a concave, rather than "a convex body."—Mayhew's Great World of London.

"Mr. Elliott, an American aeronaut, in a letter giving an account of his ascension "from Baltimore, thus speaks of the appearance of the earth from a balloon:—"I don't "know that I ever hinted heretofore that the aeronaut may well be the most sceptical "man about the rotundity of the earth. Philosophy imposes the truth upon us: but "the view of the earth from the elevation of a balloon is that of an immense terrestrial "basin, the deeper part of which is that directly under one's feet. As we ascend, the "earth beneath us seems to recede—actually to sink away, while the horizon gradually "and gracefully lifts a diversified slope stretching away farther and farther to a line "that, at the highest elevation, seems to close with the sky. Thus, upon a clear day, "the aeronaut feels as if suspended at about an equal distance between the vast blue "oceanic concave above, and the equally expanded terrestrial basin below."

"The chief peculiarity of the view from a balloon, at a considerable elevation, "was the altitude of the horizon, which remained practically at a level with the eye at "an elevation of two miles, causing the surface of the earth to appear concave instead "of convex, and to recede during the rapid ascent, whilst the horizon and the balloon "seemed to be stationary."—London Journal, July 18, 1857."

"These extracts are followed by others from Burchett's LINEAR PERSPECTIVE, the LEISURE HOUR, &c. Indeed the writer appears to have ransacked every modern publication for passages to confute the received theory of our solar system, and indeed our Geodesy in bulk and in detail. Our author is never dull, and his onslaughts on what he believes to be error are hearty and trenchant. Without endorsing his arguments, or holding his peculiar theories, we can commend these little pamphlets to the reading and thoughtful public."

THE ENGLISH LEADER, AUGUST 13, 1864.

"Theoretical Astronomy. By Common Sense. Parts I & II. (Pitman.) Either this author has not common sense, or we have not; for the greater part of what he writes we do not understand, and the part we do understand we disbelieve. The work is dedicated to Parallax, a writer who must smile at the credulity of any one who takes his view upon any subject."

THE STANDARD, MAY 26, 1864.

"Mr. Pitman has just published the first part of a little work, the author of which endeavours to prove that our present system of astronomy is entirely wrong. If not profound, the work promises to be, at least, amusing. The author will have it that the world is not round; this may be taken as a fair specimen of his opinions."

THE OBSERVER, JANUARY 15, 1865.

"Theoretical Astronomy, examined and exposed by Common Sense. (Job Caudwell, Strand.) The writer of these brochures undertakes to show that the earth is not round, even though ships may sail to the west by Cape Horn, and return by the east round the Cape of Good Hope, because no "round world" is spoken of in the Bible; because the standing order of the House of Commons has put a stop to the allowance of curvature in railway surveys; and for sundry other reasons of an equally weighty description."

THE CHURCH TIMES, FEBRUARY 11, 1865.

"Theoretical Astronomy Examined and Exposed. By "Common Sense." London: F. Pitman. THERE is hardly anything more offensive than the ignorance which affects superior wisdom and learning. To hear men who have never studied politics laying down political principles; men who have never given twenty consecutive minutes to the examination of theology and Church history, dogmatizing upon the mysteries of the Faith; men who have never read a legal book through asserting their views of jurisprudence; men who have never studied any science attempting to teach the whole cycle of the sciences, is remarkably unpleasant, but it is one of the penalties we pay for the spread of "civil and religious liberty;" one of the fines imposed upon us by the progress of what is amusingly called "education." It was but the other day we heard an argument between a cultivated theologian and one who frankly admitted that a theological training had not formed a portion of his education. The former used arguments which were perfectly unanswerable, but that did not matter. He could not get hold of his adversary, who slipped away from him like an eel in the hands of an inexperienced fisher. Let him prove as much as he liked the truth of the sacramental system of the Church, the other had always a way of escape; and at one point of the conversation a dialogue something like this occurred:—"Thus, you see, from Scripture alone—the authority of which you admit—I have shown the fact of the Real Presence. The next thing is to show how the Real Presence affects the question of reverence." "Oh, yes, but wait awhile," quoth the other, "you haven't shown that there's anything about a chancel or a surplice mentioned in Scripture." We are bound to say that the gentleman in question tried his best to prove these things also; but when he had succeeded in showing the resemblance between the Sanctuary and the Holy of Holies, and between the ephod and the surplice, his opponent closed all argument by saying "Well, you have it all at your fingers' ends: but I expect there's some answer to what you say." What need, for further controversy, when one of the reasoners takes refuge in the supposition that no doubt there is some way of escape from an obvious conclusion? Now this is just what "Common Sense" is trying to do with Astronomy, and what Protestants endeavour to do with Theology. "A little knowledge is a dangerous thing"—but it carries its own shield in its self-complacency. Have men, whose lives have been devoted to the consideration of the subject, arrived at an unanimous conclusion upon it? Why should that affect John Smith? He has a right, or so he says, to believe just as much or as little as he pleases. He won't take the trouble to study the matter—he has something else to do, he will tell you. But he takes a section of the subject, reads a "popular" book about it, picks out a few things which are in perfect harmony when considered with others as a great whole, and because they appear to "the thing he calls his mind" to clash, he begins to ridicule the whole affair; and, if in conversation, with many emphatic thumps on the table; if in writing, with many italics and small and large capitals, he expresses his scorn for the entire business as utterly unworthy the attention of a man of "common sense." What a much abused term is that! They who habitually use it are usually the most profound asses, the most insane parrots, the most utter drivellers of the entire community. The odds are, that when a man avers his "common sense" revolts at something, that something is beyond question true. Sense is not perhaps, a very plentiful article at any time; but there is plenty of "common sense" and it would be well for the world if there were a good deal less of it.

THE CHURCH TIMES,—Continued.

"We wish, however, to this particular "Common Sense," that his shadow may never grow less. He is one of the most amusing of his tribe. We all know of Goldsmith's dog which—

"to gain some private ends
Went mad, and bit the man."

and this is just what "Common Sense" supposes astronomers to have done, and what Protestants hold the Catholic Church does continually. "Common Sense" insists that the world is flat and that the sun goes round it. "Whatever seems to be, is," may be taken as his motto. We don't feel the earth moving, therefore the earth doesn't move. The sun appears to rise and set, therefore he does move. A few astronomers have differed considerably as to the sun's distance from the earth, therefore all astronomers are wrong, and for their private ends have bitten the public with the same idea. We cannot give a better specimen of "Common Sense's" argument than this, which we take the liberty of putting in our own words. Messrs. Glaisher and Corwell have gone up in a balloon to the height of two miles. When at that altitude the horizon appeared at the level of their eyes, and the space within the horizon seemed concave instead of convex. Therefore, says "Common Sense," the world is not round but flat—and Scripture is vindicated from the aspersions of Modern Science! Well, to tell truth, we never began to despair of Scripture until we discovered that "Common Sense" had taken up the cudgels in its defence.

"We beg the reader to believe that we should not have devoted so much of our space to "Theoretical Astronomy Examined and Exposed," but that we think it an apt illustration of a prevailing principle. "Common Sense," we gather from the notice of a contemporary, reprinted on the cover of one of the three "parts" before us, is a clergyman—or at least a Dissenting minister, for the use of the words "Protestant Divine" by the ILLUSTRATED NEWS proves nothing either way. He is the only even partially logical Protestant we have ever come across—for what is a Protestant but one who protests at whatever he does not understand? Now "Common Sense" certainly does not understand astronomy.

"But how many writers are every week "instructing the people" on theology, and the base efforts of ritualists, and the glorious effects of Protestantism, and the deplorable results of Puseyism, who know just as much of these questions as "Common Sense" does of Astronomy! It is their cue to run something down—and what better than that which they have studied, if studied at all, only that they may pick holes in it? Macaulay in his Essay on Milton has a passage which fits well in this place. He says:—"In every venerable precedent" a certain class of men "pass by what is essential and take only what is accidental, they keep out of sight what is beneficial, and hold up to public imitation all that is defective. If, in any part of any great example there is anything unsound [in their eyes] these flesh flies detect it with an unerring instinct, and dart upon it with a ravenous delight. If some good end has been attained in spite of them, they feel, with their prototype, that

"Their labour must be to pervert that end
And out of good still to find means of evil."

We do think that all the Protestant journals ought to give "Common Sense" a lift. He is quite of their kidney—and though his publication amounts to a *reductio ad absurdum*, they ought not to forget their friend because he has brought their principles to a logical test. The MORNING ADVERTISER, we are happy to know, has already recognized the obligation by puffing him. Cannot Mr. Whalley use his influence to get this "Protestant Divine" well noticed?"

THUS have we reproduced every Opinion which we have seen in print respecting this little Volume: and we now ask, in common fairness, is there ONE amongst the number which—opposing the matter—comes near enough to an ARGUMENT so as even to touch it? No! The fact is, it is necessarily as hard to fight against "Common Sense" as it is to "kick against the pricks." The shafts of ridicule are powerless against a coat of mail; and wit and sarcasm are poor things where people expect wisdom. It will be seen that the ILLUSTRATED LONDON NEWS started the idea—which was caught hold of by the CHURCH TIMES—that the author is "a Protestant divine:" but how this came to be imagined it is difficult even to guess. But then, how came the writer in the NEWS to imagine that "Common Sense" ever said that the Sun's distance, according to astronomical observation, has varied "four hundred millions of miles."!! How, indeed! But we look forward hoping to see better things from the hands of the Reviewers; and we trust that these gentlemen may be inspired by the spirit of genuine English "Fair Play" with a desire rather to attempt the pulling to pieces of the Facts and the Arguments which have been brought forward than with a desire merely to pick needless holes in the Author's coat.

"C. S."

CONTENTS.

CHAPTER I.

The "Exact" Science of Astronomy... Sun's Distance varied from three-and-a-half Millions to a hundred and four Millions of Miles! ... The Velocity of Light...The Daily Telegraph and the Greenwich Astronomer..... Astronomers' "Corrections".....Rev. C. Pritchard's advice ... Sound versus Sense.....Mr. Hind's version,—122,000,000 of Miles cut off Neptune's Distance, at one stroke!... "Parallax" ... Rev. R. Main's "Proofs"... Suppositions...Dr. Lardner and the "Planet"Dr. Lardner's Concave Convexity!... Mr. Glaisher's Balloon "Observation" a flat Contradiction ... B. Burchett, Esq. on the View from a Balloon, &c....Lord Brougham and Sir D. Brewster ...Rev. D. Olmsted :—his ingenuity!...The "Spherical Loadstone"...Supposition and Delusion.

CHAPTER II.

Galbraith and Haughton's Manual ... What is Theory?...The one thing needful:—simple and direct proof...Figure of THE EARTH...The Horizontal Line ... Arguments are useless when based on assumptions..... The Traveller and his money..... Belief versus Knowledge...Dr. Mann...His "Large Round Ball!"...Rev. J. G. Wood...The Boundary of the Sensible Horizon on a Level Plain... Extraordinary Navigation... Reasoning in a Circle...The Fly on the Orange.....Dr. Mann's argument upset...Is there no distinction between LEVEL and CONVEX?... Mr. Willard ... His "Proof" shown to be no Proof—like every other..... Mr. Glaisher's OBSERVATIONS Corrected and Remodelled in the Leisure Hour...M. Fontenelle on Hypothesis.....&c.

CHAPTER III.

The 'onus probandi' on the Astronomers' shoulders...Is water level, or is it not?... Webster's Propositions examined ... What a level surface really is ... An observation by Mr. W. T. Lynn, of Greenwich Observatory.....Ponds, Lakes, and Oceans level.....The "True" and the "Apparent" level of Astronomers.....What is a spherical level?... Its absurdity...Joyce's Scientific Dialogues ... The Reverend gentleman says, the true level is not a straight line but a curve!... The allowance SAID to be made by Surveyors...The Cat let out of the Bag... Surveyors' Back and Fore-sight ... A Delusion or a Cheat...The surface of the Earth all top...The new Brass Plate in the wall of Greenwich Observatory ...COMMON SENSE versus Mr. Thornton... Which end of a Survey is it that curves?—Nobody knows... Southern Cross and Polar Star seen at one time—How could this be?...The STANDING ORDER...One more so-called PROOF of Rotundity gone...Excelsior!

CHAPTER IV.

Sir John Herschel takes the Copernican system "for granted."...A bold step : but proved to be a wrong one..."Iconoclast" and Mr. Woodman ... Travelling "more than a hundred thousand miles" in a few minutes! ... An Astronomical Joke...M. Arago and his want of confidence in his own senses "As the Old Cock crows, the Young Cock learns"—The Tailor and his Coat...Sir John Herschel's "Thread" and "Pearls"...The First Step in the Wrong Road ... An Earthly Body said to be the Chief of the Heavenly Ones! ... Astronomical Arguments, Schemes, Tricks, and Conclusions.....Mr. Glaisher once more ... Sir John Herschel himself testifies that Astronomy is founded on Imagination...Truth must out sometimes...A Word of Advice, &c.

CHAPTER V.

Sir Richard Phillips, and Newton's "execrable superstitions" ... Further Examination of Sir John Herschel's celebrated Treatise ... The Will and the Way ... What does Sir John mean? ... The Beggar and the King ... "False and Fanciful Theories" Illustrated...Bradley's Geometry ... The "invisible" and the "imaginary" ... Land is in the Water...What St. Peter says is scientifically correct...Sir John's Conclusion with a New Face upon it... 'What next, and next?...' Exeter Hall Lecture' on Balloon Experiments ...Sir John Herschel and his Spherical Slice ... A little bit of Good Management ... The Hay-makers on the Coast of France.....Sir John and his "DATA"..... The Complicated Problem...Sir John and his Arithmetic...His "round" numbers ... Sir John's "rough" result!...The Book of Nature and its Teachings...The Shilling Magazine,—&c.

CHAPTER VI.

Professor Airy's Six Lectures on Astronomy to Working men...The Earth's motion ... "Do you believe it?" ...Professor Airy's "grounds for the belief."... Likelihood and Probability..... 'So much the Worse for the Facts!'..... Regularity and Punctuality... "Seeming" to Move, and Moving "Sensibly."...A "Strong Proof." ... 'If the stars be fixed, we move!' ... The Grand FACT, on Professor Airy's own authority ... "Why do NOT we turn?"...Perspective... "Something Curved!"...How it is that Ships Circumnavigate the Earth...A CHALLENGE for Professor Airy...The Zenith Sector The way in which it is said to be used, a Delusion or a Fallacy.....The Leak in the Ship of the Astronomer Royal...Absolute and Relative Position... The Sinking of the Ship!

CHAPTER VII.

Anticipation ... How far distant is "excessively" distant? ... The Thin End of the Wedge! ... One Hundred and Ninety Millions of Miles in Six Months... The Telescope and the Plumb-line once more ... "Turnip-shaped" Predictions, and "Turnip-shaped" Verifications...The Travellers' Debate...Spherical and Spheroidal...A Straight Line, the Astronomers' ARC! ... How we travel East or West, North or South ... Professor Airy's Why and Because... The Pedestrian... The Rule of Three Question ... Only a Notion!... Driving Astronomers helter-skelter... "PARALLAX" ... Sundry Objections ... 'Tumbling Over!'... The Balloon, and the Lads of the Village... The Pendulum Experiment ... Mr. Bird's Suggestion... Mr. Dunkin ... Recapitulation ... Where are we now? ... The Ocean TRUTH...Dr. Dick's Chain Thrown Overboard...Determination...Upward! Onward!... Reason's Flaunting Flag ... Common Sense. ... End of Chapter VII.

CHAPTER VIII.

A Fact stated by Professor Airy! ... From East to West, or from West to East? ... Travelling in two opposite directions at one time!.....Two sorts of 'Appearances'... Miserable Confusion ... The APPARENT Annual Motion of the Sun... It is "necessary to have" the Stars fixed!... What Theory demands, Theory gets ... The Spoiled Child ... A Review of Facts...Observations of the Heavenly Bodies... The Stars Travel Faster than the Sun ... Theoretically and Really... Debtor and Creditor... "Either supposition will do!"... No inconsistency in 'supposing' anything... The highest pitch of Controversy... Earth, a Moon!... Weighing the Earth... Light ... Darkness ... Speculation ... Beautiful, Charming, "Delightful Uncertainty!" ... The Zetetic Philosophy... A Chain of Facts! ...Theoretical Astronomy Examined and Exposed... "Heaven our Home."...In Opposite Directions ...The Christian's Penny Magazine...End of Theoretical Astronomy.

INTRODUCTION.

TIME WAS, they said the Earth was *flat*; but *now* they say it's *round*!
But strange enough, though true, it is, no *PROOF* has yet been found.
Astronomers will tell you, if you ask them, o'er and o'er,
Proofs are by no means wanting, by the dozen or the score.
COPERNICUS has told us this, and NEWTON, and the rest :
And people say '*These are the men who, surely, should know best !*'
HERSCHEL, indeed, says, in his book, '*We'll take it all for granted ;*'
But "*COMMON SENSE*" says, now-a-days, that something else is
wanted.

GLAISHER the bold, we have been told, has been far above the ground ;
But bold enough are we to say that proofs *he* ne'er has found.
And if 't be true the Earth 's a *globe*, who better off than he
To say, when looking down upon 't, *The globe I plainly see !*
But, has he said so ? No, not he : he knows his duty better
Than to utter such a falsehood, in the spirit or the letter.
When we take his *Correspondence* and his other publications,
We can find no mention of a *globe* in all his "*Observations !*"
And here 't is well to notice, that, if the Earth 's a *plane*,
To all who view it from above, 't is *concave*, in the main,
As though it were a wassail bowl, so large and yet so true,
The *horizon* for its edges, and its depths all tinged with blue.
Thus we find that *terra firma*, if we take it as it looks,
Is very far from being as 't is shown to us in *Books* :
For in them is nothing that would seem, if look'd at, *like a cup*,
But a *circle*, with a *man* on it, and a *ship*, perhaps, *sailing up !*
A *globe* this is to represent, having bottom, sides, and top,
And people all around it, *there, by some means, made to stop !*
And, all the while, 't is spinning on its *axis*, like a toy !
At least, *such is the theory* : and it's taught to girl and boy.
Six hundred miles an hour, at London, is the rate it's going,
Heedless alike of thunder's roar, or winds that may be blowing.
Professor AIRY, in his *Lectures*, says, '*young men,*' "*Do you believe it ?*"
We answer, '*No !*' and tell him, he himself need not conceive it.
But this *rotation* is as naught compared with what we're told
Of its *revolution* in its orbit round the Sun so bright and bold :

For, although we are so wicked as to say 'there's nothing in it,'
 The astronomers assure us 't is a *thousand miles a minute*!
 All evidence that we may get from the *senses* that we own
 Is nothing more (they tell us) than were we stick or stone!
They have long since *failed to trust them*, as ARAGO plainly tells us;
 And yet, to trust these very *men*, old *Etiquette* compels us!
Trust them! of course we will, when Nature's *represented*;
 But from putting faith in *theories* may we ever be prevented.
 And then, again, 'tis very plain that Nature's always taught her
 Sons to seek a *level* surface on the top of *water*.
 But Nature and her sons must learn of the *savans* who will teach them:
 For of theories they have enough, and who shall dare impeach them?—
 'The Earth a globe, and having on its surface lake and sea,
 'What other form than *globular* can the surface of them be?'
 But *water must be LEVEL*!—'O, well then, *never mind*!
 'That's but a trifling circumstance, *some* opening we shall find:
 'Just say that level's *convex*; and convex, say 'tis *level*;
 'And, then, all the mean objectors, we can send them to the
 'Books we publish far and wide, just to have *our views* in,
 'And they will find them, one and all, instructive and amusing.'
 We have been told, in language bold, that the distance of the Sun
 From Earth, in '64, is *millions NINETY-ONE*!
 In '63, and years gone by, 'twas taught in every school,
 And who forgot 'twas *NINETY-FIVE* was considered as a fool!
 But trace the figures further back, and see the great variety
 That has been taught for sober truth in respectable society:—
 There's *EIGHTY-ONE*, and *FIFTY-FOUR*, and *TWELVE*,—it is a
 fact,—
 Have all been told, in earnest, in the science called "*exact*!"
 But 'tis not only here, indeed, that error has been found;
 One wrong begets a thousand, till the error runs its round:
 The planets, one and all, have size and distance altered,
 According to astronomers, who never yet have faltered!
 In fact, the last mistake that's found in the distance of the Sun
 Is considered to be *progress*—as a battle nobly won!
Four million miles is '*nothing*' when 'tis told of Earth or Mars,
 And when *million million millions* is the distance of the stars!
 The velocity of Light's been told to the millionth of a second:
 As though 'twere possible, by man, that such could e'er be reckoned!
 The Sun itself, 'tis said, has been clearly weighed and measured;
 And the figures of the reck'ning have been kept and dearly treasured.
 But "*COMMON SENSE*" and *REASON* will never fail to show

That this is mere *assumption*, let who will pretend to know :
 That *real* proofs there *are* none (or they never have been found),
 And, this massive *theory*, undermined, must topple to the ground ;
 The "proofs" of the astronomers have *sound* but little *sense*,
 And those with Reason in their minds must banish them from thence.
 TRUTH is no more nor less than in itself persistent ;
 And he who urges aught beside must needs be inconsistent.
 The Truth is *mighty*, and shall win the crown, and then shall wear it,
 No matter who shall scoff and frown, and say they cannot bear it.
Reform begins *outside* the Institutions that require it,
 And springs of honest hearts that love the Truth and most desire it.
 A change is coming o'er the minds of men who have been slaved ;
 And from piteous delusions many spirits shall be saved.
 Astronomers who say ' the Earth 's a *globe* ' must *prove* it,
 Or else for ever from the books for youth must they remove it.

Here, then, we have a riddle, to the wise to be propounded :
 And let it not be cast aside till its depths be fairly sounded :—

Come! tell us, first, then, *how it is*, whatever else betide,
 That WATER can be *LEVEL* and yet *CONVEX* beside !
 How 't is that rivers always flow to the *level of the sea*,
 And yet the Earth, o'er which they run, in form a *globe* can be !
 Then tell us how it is that—having sides and bottom—
 This "*globe*" retains the people who are elsewhere than the *top on!*
 How ships, a few miles off, *behind the water* aught can be,
When telescopes ten times the distance will enable us to see!
 How 't is that "*lights*" in distance can at night be truly seen
 When, if the Earth were *globular*, deep space would intervene,
 And they could not be seen at all, *as they may be*, in the gloaming,
 On a level with the eye, in the distance faintly looming!
 How 't is that sailors, bound to sea, with a "*globe*" would never start,
 But, in its place, will always take *Mercator's LEVEL* chart !
 How 'tis that language always tells of the *motion* of the *Sun*,
 If really 't is the Earth that speeds her journey ever on !
 How 'tis—but, there!—or soon or late there'll come an end to 't,
 And so we bid, in friendship, one and all attend to 't.
 And if to solve each mystery you should be inclined to try it,
 You will gain a prize so valuable that money shall not buy it.

A LIST

OF

THE PRINCIPAL WORKS QUOTED IN THIS VOLUME.

.....

- AIRY, G. B., Astronomer Royal, "Six Lectures on Astronomy."
- BAIN, A., "Chambers's Educational Course,"—"Astronomy." 1848.
- BEATTIE, Dr. J., "Essay on Truth."
- BONNYCASTLE, J., "An Introduction to Astronomy." 1811.
- BOURNE, J. C., "History of the Great Western Railway."
- BRADLEY, T., "Practical Geometry." 1834.
- BURCHETT, R., "Linear Perspective."
- DICK, Dr., "The Solar System." Religious Tract Society.
- GALBRAITH, Rev. J. A.,—HAUGHTON, Rev. S.,—"Manual of Astronomy." 1857.
- HENDERSON, E., LL.D., F.R.A.S., "A Treatise on Astronomy." 1843.
- HERSCHEL, SIR J. F. W., Bart., &c., &c., "A Treatise on Astronomy."
- HIND, J. R., F.R.A.S., "An Introduction to Astronomy." 1863.
- JOYCE, Rev. J., "Scientific Dialogues." 1846.
- LARDNER, Dr., "Museum of Science."
- LYNN, W. T., Greenwich Observatory, "First Principles of Natural Philosophy."
- MAIN, Rev. R., "Rudimentary Astronomy." 1852.
- MANN, R. J., M.D., &c., "Lessons in General Knowledge." 1856.
- MOLESWORTH, Rev. W. N., "Plain Lectures on Astronomy." 1864.
- MOSELEY, Rev. H., "Lectures on Astronomy." 1839.
- OLMSTED, D., A.M., "Popular Astronomy."—"Family Tutor." 1852.
- PHILLIPS, SIR R., "A Million of Facts." Stereotyped Edition.
- THORNTON, R., C.E., "Elementary Treatise on Land Surveying and Levelling."
- TIMBS, J., F.S.A., "Curiosities of Science." 1858.
- WEBSTER, T., M.A., "The Principles of Hydrostatics."

THEORETICAL ASTRONOMY.

.....

CHAPTER I.

"*KNOWLEDGE is Power.*" There can be no doubt about this. But the question is, Where are we to look for *Knowledge*? Knowledge! We should not breathe the word unless it be representative of **FACTS**—those immutable and eternal,—those *stubborn* things. But it is quite possible that a hundred thousand people have read words like these:—"The whole of the assumed distances in astronomy must be *altered.*" If we had lived but 300 years ago, we should have learned that the earth was a level plain, motionless, and alone in all its terrestrial glory and majesty. We should have been taught that the moving Sun *did* move, and that the moving Stars were *not* fixed,—that what we saw we *did* see, and that Revelation was *NOT* false. This would have been taught us had we lived when Joshua lived, or when, in 1543, Copernicus died. But Copernicus, in the words of the historian, "was not satisfied with these ideas:" so he thought, and wrote, and left his ideas behind him. In the *Telegraph* of Nov. 27, 1863, a Greenwich astronomer tells us that "Astronomy can depend upon its followers:"—much better would it have been if no "*followers*" had ever been allowed! For, since Copernicus lived, "*followers*" have feasted and revelled upon the strength of the poor old man's legacy. We—the people—are taught that Astronomy is an *Exact Science*! Let us be certain. Copernicus computed the distance of the Sun from us to be 3,391,200 miles; Kepler reckoned it to be 12,376,800 miles; Ricciola, 27,360,000 miles; Newton said it did not matter whether we reckoned it 28 or 54 millions of miles, for he said that *either* would do *well*; Benjamin Martin, in his *Introduction to the Newtonian Philosophy*, in 1754, says that its distance is between 81 and 82 millions of miles; fifty years ago, schoolboys were taught that it was just 81 millions; in *Orr's Circle of the Sciences*, H. Breen, Esq. says it is more than 82 and a half millions; in 1784, Thomas Dilworth says 93,726,900; modern school-books, over which children now spend their playful energies and enfeeble their bodies, give us the distance as 95 millions of miles; Mr. Hind has stated that, positively, it is 95,298,260; and, according to a writer in the *Telegraph* of November the 30th, Gilliss and Gould state that it is more than 96 millions, and Mayer more than 104 millions of miles! So much for "*Knowledge*" falsely so called. But, perhaps, it will be imagined by some fond parent who is desirous that his children may be educated in this *very* "*exact science,*" Astronomy, that, in 1863, there cannot be much mistake about its fundamental principles; and that, *now*, school-books may be thumbed with perfect assurance. Those who are mindful of their children's best interests will see to this matter, and not take it for granted! There are two and a half columns of print in the *Telegraph* of November 25th, on "The

Velocity of Light," which, according to "E. D.," the Greenwich astronomer before-mentioned, form a "very interesting and elaborate article," in which is given an account of the astronomical conclusion which has lately gone unblushingly forth to the world through the public press, namely, that we are "several millions of miles nearer the sun than we have been accustomed to imagine." How suitable the word,—*"imagine!"* We are also reminded of the well-known fact that "*The distance from the sun to the earth is the MEASURING ROD used by the astronomer in determining all other distances.*" Here, also, we find details of experiments by Foucault, by means of which he "proved" that the rays of light occupied the 15-millionth part of a second in "travelling twenty-two yards." And then follow, in the most calm and business-like style, these words:—"By a simple matter of calculation this is seen to be 185,177 miles in a second." First, then, we see that the measuring-rod of the astronomer is millions of miles in length, in number from three and a half to a hundred and four, and next, that the starting-point of the optician is the 15-millionth part of a second of time! What, *then*, do we read in this "interesting" article? Why, certainly—that "*the whole of the assumed distances in astronomy must be altered.*" How *very* "interesting" to the astronomer!

But this alteration is said to be needed in consequence of M. Foucault's experiments. Not at all, says the Greenwich astronomer,—though not just in these words,—we knew all about it years ago; the credit is ours; "astronomy can depend upon its followers:" for, he says, "the great discovery of the necessity of an alteration of the hitherto received value of the solar parallax rests from astronomical investigations, though these researches have been confirmed by Foucault's brilliant experiments." Here, of course, our worthy astronomer means to say, that this "great discovery" rests *upon* astronomical observations, and not "from" them:—if "discovery" that can be called which is no discovery at all: for how, in reason, could the alterations have been so repeatedly made, if the "necessity" had not been known and felt beforehand? It becomes our duty to be *precise* in dealing with statements of so important a nature as these.

"All is not gold that glitters;" neither is all "Knowledge" that is put down as such. The first step towards REFORM is the knowledge that it is wanted. If this be just breaking out in the minds of astronomers as a mere spark, a door is open, and the spark shall be fanned into a flame fierce and destructive to that gigantic edifice which is even now trembling before the breath of public opinion: and *theoretical* astronomy, the baseless fabric of human ingenuity and folly and infidelity, shall be forgotten; and in its stead there shall be a system as beautiful as true, and which *is* in perfect harmony with practice, with reason, with nature, and with GOD.

England is, professedly, a Christian country. God only knows to what extent the hearts of the people are in consonance with their lips: but certain it is that it is of no use repeating, Sunday after Sunday, the words—"From all false doctrine, and contempt of Thy Word, good Lord, deliver us," if we do not endeavour to free *ourselves* from these evils; and this effort will never be made except upon a full conviction of

its necessity. This is easily obtained. We have seen that the distance of the Earth from the Sun has increased, *in theory*, at least ninety millions of miles since Kepler's time; and that the accredited distance has been, for the past few years, "95 millions of miles:"—the distance, diameter, circumference of orbit, and other matters relating to the planets, as well as the stars, being in strict accordance with it; and the whole mass of figures accepted by whatever people read English books,—the Zulu Caffres amongst the number.

It must now, however, be borne in mind that the very latest intelligence from the astronomical world concerning the distance of the Sun from the Earth is that it is *ninety-one millions, three hundred and twenty-eight thousand, six hundred miles*; and this is on the authority of Mr. Hind: a reduction of 4,036,000 miles having been made. At a meeting of the Royal Astronomical Society, the first of the season, an account of which we may find in the *Astronomical Register* for December, 1863, the Rev. C. Pritchard, the Secretary, spoke of this alteration as a subject of congratulation instead of confusion. In fact, so contemptuously insignificant is this avowed error of four millions of miles in the length of the "*measuring rod*" of these gentlemen considered to be, by the Secretary, that his words must be quoted, or the measure of indifference would not be believed. It must be premised that Mr. Pritchard read a Paper by M. Hansen, which, according to the report, showed that "the distance of the sun from the earth *required to be reduced by about 4 millions of miles.*" Of course, the writer intended to say that *they*, the astronomers, "*required*" that *their assumptions* concerning this distance should be reduced that small amount,—which is a very different matter. The words of the Report are as follow:—"Mr. Pritchard observed that many persons had taken occasion to 'ridicule the labours of astronomers from this circumstance. 'Four millions of miles!—what donkeys the astronomers are to make such a mistake: we took astronomy to be absolutely accurate. Down goes astronomy, up goes theology: the astronomers confess to a mistake of four millions of miles!' But let us look at this distance of four millions of miles a little more closely. The Sun's Parallax is eight seconds and a half; four tenths of a second are to be added. How can this be represented? Take a hair and measure it, and you will find that the correction amounts to this—that we have to look at a hair at a distance of 125 feet! That is the correction astronomers have made. Or let us look at a sovereign at a distance of eight miles—it amounts to about the same thing. Instead, therefore, of saying 'down with astronomy and up with theology,' Mr. Pritchard added, we ought to be thankful that we are able to calculate and correct such nearly inappreciable quantities."

Fiddle-de-dee! We are to be thankful that there are men who can calculate and correct certain "quantities:" but what have they done, by their own showing, but *mis-calculate*, and "correct" their *mis-calculations*? But, concerning the "hair," Mr. Pritchard! Why measure a hair, except it be for *length*?—when we all know that the *best* term for the *breadth* of a hair must be—a *hair's-breadth*? You say "take a hair and measure it, and you will find that the correction amounts to this—

that we have to look at a hair at a distance of 125 feet!" And you say "*That is the correction.*" Why, every one knows that to look at *anything* at any distance has in it *nothing of the nature of a correction.* That which a man sets up for himself to look at can be nothing more than a thing to call forth the use of his eyes. Really, this language is *sound* enough:—but where is the *sense*? In looking at hairs, or sovereigns, is there any *art*?—any *merit*? Why, working-men *earn* sovereigns and *split* hairs at the same time! No, no. *That* is not the correction, Mr. Pritchard: *this* is it,—on page 162 of the *Astronomical Register*, in the words of Mr. Hind. The "diminution" in the hitherto accepted "velocity of light per second" is "8,000 miles;" in the "diameter of the sun, 38,000 miles;" and in the "circumference of the earth's orbit, 25,360,000 miles." Mr. Hind continues:—"The distances, velocities, "and dimensions of all the members of the Planetary system of course "require similar corrections,"—"in the case of Neptune, *the mean distance is diminished by about 122,000,000 miles!!*" But Mr. Hind has left us here—*here*, on the dim boundary of this theoretical Solar System—standing in Neptune's track. He has not ventured even to whisper what may be the correction necessary in the figures which express the circumference of Neptune's orbit. And what is there *beyond* our present imaginary position—2,860 millions of miles from the Sun? Herschel speaks of *Stars* whose light takes 350,000 years to reach us, and of *other stars* at *ten times* the distance of these!! *All—all* these theoretical statements must be corrected. *This*, then, is the correction, Mr. Pritchard. But, the worst has *yet* to be seen. The Reverend Secretary says, "instead of saying 'down with astronomy, and up with theology,' we ought to be *thankful*," and so on:—in fact, it is the modern tale, wrapped in fine language, telling us that we must be still *more* proud of astronomy; that God's Word must be bent to man's masterly discoveries; and that still *more* must theology go down!—Never! What, for a science like *this*?—a science which *shall be proved* to have no foundation *in fact*? *Never!* The crisis has past. The sun, *surely*, can *never* again go so far from us—though but in *theory*; as the pale moon belongs to *us*, so shall the Sun be *our* Sun—as Our Father has told us—"to rule over the day and over the night"; and the time *shall* come when "*TEKEL: thou art weighed in the balances, and art found wanting,*" shall not be found, as it *now is*, inscribed over the forehead of Astronomy.

But the question may be asked, "What, then, *are* we to believe, if the common doctrines are false?" The answer is,—All that remains of Theoretical Astronomy when every known error shall be blotted out:—better to believe that we know but little, than to know that we believe a mass of questionable theories. Perhaps, however, the most popular essay on the subject is in the first number of *Chambers's Information for the People*: this may be accepted as being *near* the truth, until we find, as we certainly shall, that the writer begins to contradict what he has previously asserted,—it is then prudent to put the book on the shelf, and "search" another. The Biblical accounts of the Earth and the Heavenly Bodies present no such difficulties to the enquirer, since they maintain that strict uniformity which is the badge of *Truth*. One popular error

must here be noticed, and, so far as our influence extends, erased. It is this:—that the Bible speaks of the *round world*. The *Prayer Book* does, indeed: but Cranmer's *Prayer Book* and *God's Revealed Word* are not *one* in effect any more than they are one in their origin.

We have seen that Theoretical Astronomy has no just claim to be considered as a branch of Knowledge, unless, indeed, a *rotten* one be worth considering: and, if that be fit to hang a man's *faith* on, a small amount, indeed, must he possess. We have seen that the star-spangled banner of Theory has been unfurled in defiance of the noble army whose standard is Theology. It may appear as though successes had been achieved. Truly, there are Astronomical Theologians,—men who, after fighting down the antagonistic principles of others, have taken them into their *own* breasts, that *there* the warfare may be carried on. We have stated that we are not free from the taint of “false doctrine,” and the crime of “contempt of God's holy Word.” We have shown, thus far, that these evils are the *Satellites* of Theoretical Astronomy. And we have promised that the *Theoretical Astronomy* of the present day shall be proved to have no foundation *in fact*.

Now, then, to our task: and may GOD defend the RIGHT! *Chambers's Information for the People* says:—“ASTRONOMY teaches whatever is known of the heavenly bodies.” This is well said. “Whatever is known.” But it pretends to teach us a great deal more. *Chambers's Information*, for example, says, in continuation,—“The earth itself it regards only as one of *them*,”—the heavenly bodies; and it seems, at the present day, to excite no surprise that this should be considered to be *true*!! Let us examine, then, what astronomy *has* taught us; what it *would* teach us; and the *manner* in which these teachings are held out to us. We have already “broken the ice,” and thrown out, rather than cleared away, one or two difficulties, of which, perhaps, not the least in magnitude is “parallax.” What is it? Parallax is the displacement which *seems* to be occasioned by viewing a distant object *from* different points: just as the colours of things *appear* to change with the colour of the glass *through* which they are seen. An astronomer, the Rev. D. Olmsted, says that “The errors to which instrumental measurements are subject, arising from the defects of instruments themselves, “from refraction, and from various other sources of inaccuracy, are such, “that the angular determinations of arcs of the heavens *cannot be relied on to less than one second*, and therefore cannot be appreciated by “direct measurement.” But we have seen that “four tenths” of a second,—four tenths of a three thousand six hundredth part of a degree—have been added to the parallax of the sun, thereby reducing its supposed distance. This will explain the “nearly inappreciable quantities” spoken of by the Rev. C. Pritchard; and impress upon our minds the conviction that “parallax” is a thing which astronomers *WILL* see, in some way or other! But the *other* “Parallax,”—the living, thinking, speaking, *man*,—he who opens the eyes of the *public*,—is far too small to be seen by astronomers, though he has many times asserted his presence in their very midst! Happily, we know that *all* Reform originates *outside* of the institutions that require it: there is, therefore, hope for the future even *now*.

We sometimes hear people say, when speaking of some great movement slowly creeping on and on,—“O, it’s all nonsense: it’s a most *absurd* thing!” These people forget, if ever they knew, that the greater the absurdity the more easy would it be for them to hit it, if they chose to try. No: *we strike* the blow, and let *who will* oppose.

There is a volume written by Rev. Robert Main, when First Assistant at the Royal Observatory, Greenwich, called *Rudimentary Astronomy*, which contains the following observation. “As it is evident that “the earth must ultimately be our basis for measuring everything external to itself, we will begin by inquiring by what means we derive “our ideas respecting its size and figure.” We are then favoured with the assertion that “The earth is, roughly speaking, round or spherical, like a ball or an orange.” And then follow “the ordinary proofs.” We will take one and look at it. The Reverend astronomer says,—“Lastly, “ships have actually and repeatedly made the circuit of the globe; “that is, by sailing out from a certain port in a westerly direction, they “have returned to it in an easterly direction, or *vice versa*.” We see, by this language,—given for the express purpose of teaching us *how* the astronomers’ “idea,” that the earth is a globe, is obtained,—that it is a globe because ships have sailed round the globe!! This is the plain English of that “proof” which is given “Lastly,” as though it was a positive wind-up of the whole affair! This is something, indeed, for those whose cry is —“*absurd!*” and, unfortunately, this is the kind of reasoning which is to be found plentifully scattered along the shores of that rich, rough Ocean of Truth which it is our duty and our privilege to explore, and the approaches to which it shall be our earnest and continuous endeavour to free from those obstacles which are so common and so out of place.

Dr. J. Beattie, in his *Essay on Truth*, says:—“When men are “once satisfied to take things as they find them; when they believe “Nature upon her bare declaration, without suspecting her of any design to impose upon them; when their utmost ambition is to be her “servants and humble interpreters; then, and not till then, will philosophy prosper.” But would-be philosophers dictate to Nature, and impose their “theories” upon the people, till the people are in a complete mental fog, and are ignorant of what they *do* know. Is there anything more valuable than TRUTH? Its value is enhanced a thousand-fold since it has become so rare. Is the Earth a globe, or is it not? Is it spinning through space, like a huge top,—rotating on its axis at the rate of 1,000 miles an hour,—revolving in an orbit round the Sun at 68,000 miles an hour,—and being dashed along “towards the constellation Hercules at more than 154 millions of miles a year,” or is it not? Is this Earth a “heavenly body,” or is it not?—a planet or not? Is it one amongst millions of inhabited worlds, or is it “THE WORLD?” Is it likely, as PAINE asks, derisively though logically, in consequence of astronomical teachings, in his *Age of Reason*, “that every world in the boundless creation had an Eve, an apple, a serpent, and a Redeemer?”—or is it not? Or is it likely, as Dr. CHALMERS suggests, that *this world was the worst of all, and that we—being the only lost sheep—alone required a Redeemer*, or is it not? Is water level,

and yet "*convex*" at one and the same time, or is it *not*? Are there people with feet to our feet—antipodes—or are there *not*? Do astronomers regard the *Law of Perspective*, or do they *not*? Do surveyors really allow anything whatever for "the earth's rotundity," or do they *not*? Do all nations and tongues speak falsely in saying—"The Sun rises!"—"The Sun sets!"—or do they *not*? All these questions, and a hundred others, appear like giants in the fog: but whence come they? We shall see; and, if people will but cease to be the slaves of other men's minds, and think for themselves, we promise that they shall reap a rich reward.

Every sharp English youth knows, or might, could, would, or *should* know, that to reduce a thing to an intelligible form is neither to add to it nor to take from it: in fact, that *Reduction* is not *Addition* or *Subtraction*. We have seen that one of the Rev. R. Main's "*Proofs*" that the Earth is "round or spherical, like a ball or an orange," is that "ships have actually and repeatedly made the circuit of the globe;" and we have seen that, in plain English, this is—the Earth is a globe because ships have sailed round the globe! But we must reduce this into still plainer English, just as we reduce a large number of farthings into a small number of pounds, that we may take a more comprehensive view of the matter. It will then stand thus:—The earth is a globe, because ships have sailed round it. Now we can see, more clearly, the nature of the supposed "proof." If the sailing of ships round a thing proves that thing to be a globe, then the Isle of Wight, for example, can be proved to be a globe: for ships have sailed round it. But *this is absurd*. Yes: and so is the *other*. But, as though the Reverend gentleman felt that this proof, which he gives "Lastly," had some weak point about it, he straightway props it up with *another* "Lastly," and we read as follows:—"Lastly, the "phenomena with "regard to the heavenly bodies, which ought to take place on such a "supposition, actually do take place." "On such a *supposition*!" Mark the word! This, following, as it does, the *other* proof, undoubtedly refers to it: so that the assertion that "ships have *actually* and *repeatedly* sailed round the globe" is, on the Reverend gentleman's own showing, a *supposition*, and, therefore, cannot be a *proof*! What more conclusive evidence do we require that the whole "theory" is a scientific delusion?—and this from the pen of one who is engaged in upholding it! For, if a "proof" given be admitted to be but a supposition, what can we expect that to be which it is intended to prove?

But the Reverend Astronomer has given us "ordinary proofs" *other* than those which we have quoted, and which we have shown to be rather extraordinary. The first is this:—"A person standing on the sea-shore, "and watching the approach of a ship under sail with a telescope, would "first see the top-masts and upper sails, next the mainmast and lower "sails, and lastly the hull." This is a *fact*. And there are a great many *other* facts which have in them no more evidence that the Earth is a globe than this has. Mr. Glaisher, for instance, has, many times, been with Mr. Coxwell into the higher regions of the atmosphere: but as to there being a single cobweb of testimony, resting on Mr. Glaisher's evidence, that the Earth is a globe, we say *no*—positively, *no*:—quite

the reverse. The language used by Mr. Main, while it *expresses* a fact, *implies* that which is *not* a fact:—it implies that when ships are coming in sight they are coming up. If ships *really* came up to us, we should have to look, *really and apparently*, DOWN to them: but, as these ships do NOT, *really or apparently*, come up to us, but come *across or over* the water, they come, *really*, on a level, as is the water, and, therefore, by virtue of the *Law of Perspective*, *apparently*, DOWN to us. Hence the popular phrase,—“The ship bore down upon us.” Therefore, the language used in this so-called “proof” *must not be allowed to IMPLY* that which is delusive,—for this delusive implication *alone* it is that has been as dust in the eyes of thousands, causing them to be led away from the main fact—as *stated in words*—that the masts *appear* first and the hull last. But we hear it said “If it be a fact that the masts are seen first and the hull last, what *does* it prove?” This is a question to be attended to, in its proper order. All we have to show, here, is that it *does NOT prove* that which it has been *said* to prove.

Away, now, to the sea-side: and let us look Nature full in the face! How beautiful! No sophistry furrows *her* brow. List to *her* teachings. they require no “proof,” since nothing can be plainer. As we stand at her feet, where the briny waves bid us keep respectful distance, we begin to learn the lesson that we would not dare to doubt. As we look over the outstretched waters, we see the *horizon*, on a level with our eyes; and yonder ships are homeward-bound! *Are they coming up?* It does not *appear* so. We ascend the cliff; and we have a still more *extended* view. *Is it further down?* No! We see more ships. *Are they coming up?* No! The horizon is still level with our eye. We will ascend yonder light-house,—on the highest crag. Still more *extended* is the view! Still more ships are visible! *Are they coming up?* NO! This is enough. The horizon is always on a level with the eye. It rises on and on as we rise on:—it is *the horizon*. But this is not enough for *all*. Mr. Glaisher ascends *far above* the light-house. What says *he*? We will learn of him. Why, though he computes that he went above the Earth for five or six miles,—“The horizon *always* appeared on a LEVEL WITH THE CAR.” Mr. Glaisher has not seen anything *like* a globe! Shall we be led away, then, by this delusion, that when we stand on the sea-shore, we can *see the ships coming up?* It is impossible. Then away goes *another* “proof” of the Earth’s rotundity.

But the Reverend Mr. Main has given us another. His second “proof,”—the only one we have not quoted, is this:—“Two ships “approaching each other under sail, in like manner, first become visible “to each other from their respective mast-heads, the lower portions “coming successively into sight.” This “proof” is nothing more than the first one doubled. The only observation to be made is that, the first proof having been thrown overboard, the *second*, like unto it but doubled, may, to all intents and purposes, be considered as having been thrown overboard, too. Learn we, then, a lesson, from Dr. James Beattie, that, unless we be “satisfied to take things as we find them,” philosophy will *never* prosper.

It will be said that the errors into which a man may fall, in defending a cause, do not prove his cause to be a bad one; but that *he* is unfit to

be its defender. This is true, so far as it goes. But what shall we say if the errors are common to those advocates who are the most popular? What can we think when each in his turn falls? One conclusion, only, can be arrived at:—that not only is the cause a *bad* one, but that its exponents make it worse. But this is speaking in general terms: is it so with astronomy in particular? Yes. But we are bound to *prove* this. Who has not heard of Dr. Lardner? In his *Museum of Science*, he says:—"Of all the objects which compose the universe, "one of the most difficult of which to obtain a complete and accurate "knowledge is the planet which we inhabit." "The *planet!*" And this is the Doctor's way of speaking, in the first sentence of a treatise on *The Earth*; and, further on in his work, he says "Is it, as it appears, at rest?" Who ever heard of a *planet* being at *rest!* But why call it a *planet*? For this plain reason:—Dr. Lardner was born in an age and in a country in which the *prevailing opinion* of the so-called educated classes was to this effect. He found the Newtonian Philosophy ready to his hand, and he took it up. He, like most others, has been drifted along with the tide of popular opinion: a fair wind and a pleasant prospect offering inducements which but few are inclined to resist. Respecting the fixedness of the Earth, Dr. Lardner continues,—"For several thousand years in the history of the human race, it "was not only so considered, but he that would have ventured to call "in question its stability and quiescence would have been deemed in-"sane." Would Doctor Lardner have *lost his* reputation, had he lived in *those* days? We know not: but the natural conclusion is that Dr. Lardner, *then*, would have been as *popular* as is Dr. Lardner *now*. It is clear that when men *start* with a *conclusion*, and *that* a mere popular opinion, there is no telling where we may be led, if we be so blind as to accept of their guidance.

Dr. Lardner distinctly asserts that the chief difficulty in obtaining knowledge respecting this "planet," as he calls it, is that of our "proximity" to it, and "intimate connexion" with it. He says, "We are "confined upon its surface, from which we cannot separate ourselves;" and, also, that "We cannot obtain a bird's-eye view of it, nor at any "one time behold more than an insignificant portion of its surface." Just, therefore, in proportion to the presumed difficulty experienced, should be the amount of pains bestowed upon the investigation. Facts are either self-evident or demonstrable. Just, therefore, we repeat, as the *evidence* is *weak*, should the *arguments* be *strong*.

Dr. Lardner's "proofs" of the rotundity of the Earth bear a striking family resemblance to some which we have seen before. Dressed up, indeed, they are, in a manner which, while it serves to keep their true bearing from the scrutiuizing glance of the people, brings forcibly to mind the old proverb that "Whilst craft must be veiled, truth goes naked." Dr. Lardner says, when speaking of ships coming in sight masts first and hull last,—“Since this takes place on all sides around “us,”—and we must now imagine ourselves to be *out* on the sea,—“it “will follow that when the ship is at a distance, there must be *some-* “*thing* interposed between the eye and it which intercepts the view of “it; but as the surface of the water is generally uniform, and not subject

"to sudden and occasional inequalities like that of the land, we can "only imagine its general form to be convex, and that its convexity is "interposed between the eye and the object so as to intercept the view."

Now, Doctor Lardner, we differ: and we are in a capital place to settle antagonistic views,—the sky above; the sea below. We are deeply in earnest. Our craft is alongside of *your* craft: and, if we do n't sink *you*, you shall sink *us*! First of all, then, we shall attack you upon what you *say*: so that, getting rid of this difficulty, we may have a clear stage upon which to attack your *meaning*, for *that* is the vital point. Ships are around us; some claim our attention more than others: they are, in nautical phraseology, "hull down,"—in common language, the hull is out of sight. Take one for example. You say, "there must be *something* interposed between the eye and it which intercepts the view of it." If this *be* true, for what reason do you say that this "*something*" is *convexity*?—since "*convexity*" is *nothing*—*that can be interposed*! If a man stood before you, and his *hat* was interposed between you and an object that you wished to see, he would think it very strange if you requested him to remove his hat's *rotundity*! But, Doctor Lardner, respecting this convexity, you say that you can "only imagine" that the surface of the water *is* convex! So that, from your words, it amounts to this: that there must be *something* existing as an obstructive to our vision; and that you can only imagine it to be—*nothing*! But you say "there *must* be something interposed," *since* the phenomenon in question "takes place on all sides around us." Now, Doctor, you can no more *intend* to say this than you intended to say that *something* was *nothing*. For, if there be something really interposed between us and the ships, *all around us*, we must, for that very reason, be *in a hollow, or a concavity*! Now, you have told us that you can only imagine the surface of the water to be *convex*. How, then, can we be *in a concavity*, when we are on this *very* water? It is absurd. We may consider, then, that your *words* are out of the question altogether: since contradiction and absurdity are obstructives to the realization of Truth.

We have now, Doctor Lardner, to deal with your *meaning*,—which we have arrived at by an intuitive process similar, it may be, to that exercised by a mother whilst listening to her child's unintelligible prattle: a process more nearly allied to instinct than to reason. We, in our turn, "can only imagine" that you mean this:—That, between our eye and the ships which are *hull-down*, WATER is interposed; that a straight line, passing from us to a ship, would cut *through* the water; and that, therefore, our view is obstructed by—and we are surrounded with a wall of—*water*: the word "*convexity*" being made use of, by you, instead of the word *water*, for reasons quite out of the power of our imagination to conceive. Now, Doctor, we intend to get at the plain, straightforward facts, by some means. And, just as, in warfare, the powder and shot used are not *made* by those who *use* them, so would it be unjust to demand that all the facts which we bring forward shall be of our own *personal* observation: especially as it is well known that *documentary* evidence must necessarily constitute an important element in human affairs. We know that opticians advertise,

for sale, telescopes to be used for objects at distances varying from five miles to fifty: and we are justified in believing that these instruments are really available for the purpose for which they are intended. But documentary evidence is not wanting to show that the matter has been tested, over and over again, that if one telescope will not answer a purpose, *another one may*. Now, Doctor Lardner, the ocean is, as you justly observe, "not subject to sudden and occasional inequalities," as is the land: it must be, therefore, the best of all possible places where observations may be made, with telescopes of greater or less value. Such observations have been made. But how will it be if we direct these telescopes, though they be for distances varying from five to five hundred miles, towards that ship, yonder, the hull of which is, as you would have us imagine or believe, behind a hill of water? What difference would *telescopes* make in our attempts to see the ship's hull, if the ship be, with respect to us, in the position which you say it is? What should we be trying to do with them?—trying to see *over* the hill of water, or *through* the hill of water! It is clear that no instrument on earth, or on-board ship, can help us to perform an *impossibility*! Well, then, Doctor Lardner, as ships *are* seen, by the aid of telescopes, which, without them, appear *hull down*, as it is called,—as telescopes *do* answer their intended purpose,—as the limit of your vision over the ocean is owing to the strength of your eyes and the "power" of your telescope,—your *hill of water* stands before you a monument of those miserable shifts and subterfuges and contradictions and absurdities to which people are obliged to resort when they presume to dictate to Nature; and, from all of which evils, we say, from our inmost heart,—*"Good Lord, deliver us."*

Perhaps it would be impossible to over-estimate the importance of that action of the mind which we call *observation*. What would be the condition of man without it, no one can imagine. Observation—the faithful monitor in many branches of science—is found, too often, to be a slave in the keeping of Theoretical Astronomy: bending and yielding in every direction in obedience to the iron will of prejudice, self-interest, or pride. From this point of view, we will examine one or two specimens of astronomical teaching which are, probably, familiar to thousands of seekers after Truth. We are still searching for information respecting the Earth; and it shall not be said that we take an insignificant view of the matter before us, or skip over those authors whose arguments would outweigh ours. We will turn, then, to Dr. Comstock's work on Astronomy. In his "Dictionary of Terms," we read as follows:—"EARTH, or TERRA. One of the planets: its orbit lies between Venus and Mars. Its diameter is 7914 miles, "and observation proves it to be inhabited." As Mr. Hind, in his *Introduction to Astronomy*, has given us a pictorial representation of the "*Probable appearance of the Earth as seen from the Moon*," may it not, reasonably, be imagined that this "observation" was made in the Moon, or some other ultramundane position? Perhaps, however, "observation" was simply playing the *Fool*, for his owner's pastime, when so startling a decision was arrived at as that the Earth is *inhabited*! Be this as it may, we turn to another source for *proof* of the Earth's

planetary nature, which is, certainly, not forthcoming here. We will avail ourselves of the evidence afforded by Mr. Glaisher's observation: and, we shall expect to find it conclusive, in consequence of the splendid opportunities with which Mr. Glaisher has been favoured. But, first of all, in order that Mr. Glaisher's observation shall be fully appreciated, we must give some of the results of the observation of men who have had no "theory" tied about their necks to bind them as to a mill-stone. We quote the following passages—for which we are indebted to "Parallax:" as we copy them from a paper, which he has published, on *Zetetic Astronomy*—just as we would give an illustration of the blessings of freedom before we would picture the horrors of slavery.

"The apparent Concavity of the Earth as seen from a Balloon."

"A perfectly formed circle encompassed the visible planisphere beneath, or rather the concavo-sphere, it might now be called, for I had attained a height from which the surface of the Earth assumed a regularly hollowed or concave appearance—an optical illusion, which increases as you recede from it. At the greatest elevation I attained, which was about a mile-and-a-half, the appearance of the world around me assumed a shape or form like that which is made by placing two watch crystals together by their edges, the balloon apparently in the central cavity all the time of its flight at that elevation."—WISSE'S *AERONAUTICS*.

"Another curious effect of the aerial ascent was, that the Earth, when we were at our greatest altitude, positively appeared CONCAVE, looking like a huge dark bowl, rather than the convex sphere such as we naturally expect to see it. . . The horizon always appears to be on a level with our eye, and seems to rise as we rise, until at length the elevation of the circular boundary line of the sight becomes so marked that the Earth assumes the anomalous appearance, as we have said, of a CONCAVE, rather than a CONVEX body."—MAYHEW'S *GREAT WORLD OF LONDON*.

"Mr. Elliott, an American Aeronaut, in a letter giving an account of his ascension from Baltimore, thus speaks of the appearance of the Earth from a balloon:—'I don't know that I ever hinted heretofore that the aeronaut may well be the most sceptical man about the rotundity of the Earth. Philosophy imposes the truth upon us; but the view of the Earth from the elevation of a balloon is that of an immense terrestrial basin, the deeper part of which is that directly under one's feet. As we ascend the Earth beneath us seems to recede—actually to sink away, while the horizon gradually and gracefully lifts a diversified slope stretching away farther and farther to a line that, at the highest elevation, seems to close with the sky. Thus, upon a clear day, the aeronaut feels as if suspended at about an equal distance between the vast blue oceanic concave above, and the equally expanded terrestrial basin below.'

"The chief peculiarity of the view from a balloon, at a considerable elevation, was the altitude of the horizon, which remained practically on a level with the eye at an elevation of two miles, causing the surface of the earth to appear CONCAVE instead of convex, and to recede during the rapid ascent, whilst the horizon and the balloon seemed to be stationary.'—LONDON JOURNAL, July 18, 1857."

We must just give one extract from a work on *Linear Perspective*, by R. Burchett, Esq., Head Master of the Training Schools for Art Masters, of the Science and Art Department,—a work which proves its author to be a man of no ordinary freedom of thought, and to possess "observation" fitted to be his guide and our model.

"If we have an unobstructed view of a level plain, or of the sea, we shall observe that such plain or sea will appear to rise as it recedes, until, at the extreme limit of vision, the plain or sea will appear to meet the sky, in a line immediately opposite to our eye, such line coinciding with the HORIZONTAL LINE. . . . So, in ascending a high hill in the midst of a plain, as we rise, the view expands, and its limiting distance appears to rise also; in ascending in a balloon, the landscape appears to rise in the form of a basin until the whole view is lost."

And, now, what says Mr. Glaisher. In the *Leisure Hour*, No. 563,—

the number which contains an account of the labours of *G. B. Airy, Esq.*, Astronomer Royal, accompanied with his portrait.—there is an article on *Balloon Ascents*, which, at first sight, *appears* to be, entirely, from the pen of Mr. Glaisher himself, as one half of the said article, *avowedly*, is: and, to show that this is the common impression, we may state that the words which we shall quote have been held forth to us, by intelligent men, as Mr. Glaisher's *own* words, overthrowing the evidence of the non-rotundity of the Earth gained by taking an elevated view of it. That part of the article, from which we have to quote, consists of more than three columns of very minute observations, and will be found to be taken from "a local paper:" the neighbourhood of Wolverhampton being referred to. Just as, however, the poor, hard-working reporter for a country paper has something else to do than to invent a mass of technicalities,—just as, in the nature of things, it is right to suppose that the article cut from the "local paper" was carefully revised before being reprinted in the pages of the *Leisure Hour*,—and just as it has not, in our knowledge, been disowned by Mr. Glaisher,—so we decline, with abundance of reasons, to father it upon "reporter," "editor," "printer," or any one else in the world but Mr. Glaisher. And here is the extract, word for word:—

"Among other observations it may be added that the earth did not "present a concave or cup-shaped appearance, according to the popular "belief, but the horizon always appeared on a level with the car."

Here we find a statement which is, perhaps, unparalleled in the scientific literature of the nineteenth century. "Observation," in this case, was amongst a crowd of other observations; and, so far from being a slave to another's will, was but as an idiot, having no sense of justice, rectitude, or truth; uncared for by the world, and caring not for it. "Observation" has aimed a senseless blow at a "popular belief" which has been correctly founded on the experience of aeronauts, travellers, artists, and all who have had their eyes open or their wits about them. And the blow has told. Society is made up, in part, of good, innocent people, who are easily won by the appearance of respectability or high-standing; and who allow their share of the *thinking* part of the world's business to be done by proxy, and it pleases them well:—people who delight in sounds harmonious or discordant if they do but rank as Music. With these people, the blow has told. But, Thinking Men: you have suffered no harm. You can discriminate between the notes of falsity and the sounds of truth. "*The Earth DID NOT present a concave or cup-shaped appearance, according to the popular belief!*" This is the first part! "*BUT the horizon always appeared on a level with the car.*" This is the second part! And, to see that the two parts of the statement *clash with each other*, you require no consideration. The *fact* of the horizon always appearing on a level with the car, or with the eye of a spectator in the car, of a balloon; and the *fact* that this *could not be the case without a CONCAVE appearance* of the Earth being presented; is sufficient to satisfy any man of common sense that the Earth, on the particular occasion alluded to, *must have presented that CONCAVE appearance* which "observation" says it *did not!*

On the 31st of March, 1863, Mr. Glaisher ascended, from the Crystal Palace grounds, in Mr. Coxwell's large balloon: this ascent taking place at about nine months after the one which gave birth to the "observations" to which we have already referred. In Mr. Glaisher's account of this ascent, published in the newspapers, at the time, we may read as follows:—"Taking a grand view over the whole visible plain beneath, I was struck with its regularity. The view did not seem natural; it was too even, apparently artificial." *Nature not natural?* What next? But we can sympathize with "observation," here. We can see the load of "theory" under which he laboured. As the slave when first made free has been known to sigh to have back again that artificial state which to him was natural, so "observation," when lifted above his "theories," has complained,—"*The view did not seem natural!*" Observation! Did you expect to find a *Globe*?—and did you find it—not? Did you think of those illustrations, which are given in astronomical books, in which a spectator in a balloon or on some elevated position is represented as looking DOWN over the convex surface of a globe, *at an angle of forty-five degrees*?—Did you look for these to be correct: and did you find them—not? Sad disappointment! You will have to take Nature as you find her, after all! The view will not seem *theoretical*, certainly: but though Nature's facts and your theories are at war, you may be sure that the facts are invincible, and that the theories must, inevitably, be crushed.

"*Observation!*" Take counsel. If you can help yourself, be neither fool nor slave. Get wisdom, and get rid of your jokes. Abuse not your faculties, and you will retain them. Shake off the shackles of prejudice, and be free. Remember that your master's reputation is in your keeping. Wash your hands, therefore, from all those impurities which lie about your path: so that, in due season, *that* reputation may be handed down, to those who value it, an unsullied testimony to the simplicity and beauty and harmony of the works of Him who is the God of Nature and the God of Truth.

Lord Brougham, in speaking of the theories of the astronomers, has used the following words:—"Of all the millions that thoroughly believe these truths, certainly not a thousand individuals are capable of following any considerable portion of the demonstrations upon which they rest; and probably not a hundred now living have ever gone through the whole steps of these demonstrations." And Sir David Brewster, in reference to the same subject, says:—"To millions of our species, then, the great Book of Nature is absolutely sealed."

"Sealed?" Sir David! And does the seal bear no impress by which we may arrive at a knowledge of the hand that affixed it? Is there no sign that the seal is from the same Divine Hand as the Book? Is there no mark of Omnipotence?—no indication that an Omnific hand has pressed it? How is this? Perhaps the seal is of human origin. We must learn more about this matter! "Sealed?" Sir David! Shall the purest, the fairest, the most lovely of Books, the Book of Nature, gilded with sunbeams, and radiant with dewy pearls from its Author's Hand, be *sealed*,—by its Author,—when the Book of Revelation, which has been transcribed and translated by human hands, is

bidden to be free? Impossible. Then, *Man has done it*. The seal is not coeval with the Book: it is of modern date; and it shall be shown to be a counterfeit, doomed to be destroyed. By human hands has it been affixed; and by human hands shall it be removed. We have already examined a few of the "demonstrations" which compose the basis of that seal which man has had the audacity and the arrogance to place upon the Book of Nature, and we must proceed with the work which we have begun. The Rev. D. Olmsted has written much that is intended to set Nature before us, astronomically. We must now examine his teachings concerning the Earth: and decide whether we shall accept or reject them. We quote them from a work of a popular description—the *Family Tutor*. They are as follow:—"We should contemplate the Earth as a huge globe, occupying a small portion of "space, and encircled on all sides, at an immense distance, by the "starry sphere." To this, we reply:—"contemplate" that which is neither self-evident nor demonstrable, neither probable nor possible, is to contemplate an absurdity: and, though we plead guilty to the fact of having done this very thing for years, we, knowing better, unhesitatingly decline to do it, for the future. The Reverend gentleman continues:—"We should free our minds from their habitual proneness to "consider one part of space as naturally *up* and another *down*, and view "ourselves as subject to a force (gravity) which binds us to the earth "as truly as though we were fastened to it by some invisible cords or "wires, as the needle attaches itself to all sides of a spherical loadstone." There are some things more easily *spoken* of than *done*. It is not possible to "free our minds" from any "habitual proneness" whatever, if it be in accordance with the dictates of Nature, without going out of our minds to do so. As well attempt to free our minds from their "habitual proneness" to consider *eating* to be necessary to human existence! This would afford no plainer evidence of insanity than is shown by the attempt to ignore the fact that there is one direction which we call *up*, and another which we call *down*. Even our author *himself* could not do this, as we shall presently see. His words are illustrated by an engraving of a globe, with figures of men in different positions on its surface,—at the top, the sides, and the bottom. This picture is, of course, supposed to represent Nature. But a difficulty arises. Here is the picture, certainly, with one figure of a man *upright*; two, in a *horizontal* position, at the sides; and one, hanging suspended, *head downwards*, at the bottom. Now, every one knows that, on whatever portion of the earth's surface man has yet been found, he stands *upright*. And, although it may appear *scientific* to speak of man being as though he were "fastened" to the soil on which he treads "*as the needle attaches itself to all sides of a spherical loadstone*," yet, in some way or other, it does not seem to be *quite* as it should be, when we look at the picture. There is something about the man who hangs with his head downwards that makes one question both his comfort and his safety. But the ingenuity of the astronomer knows no bounds. This is a matter of no difficulty to him! Let us see how easily the Reverend D. Olmsted has mastered this subject! We must observe that, in the picture, the position of the man who is standing *upright* on the globe is marked "*a*,"

and the heaven above his head is marked with another "*a*;" and the other figures, with their respective heavens, are distinguished with the letters "*b b*, *c c*, and *d d*." The Reverend gentleman says, "We should dwell on this point until it appears to us as truly up, in the direction "B B, C C, D D, when one is at B, C, D, respectively, as in the "direction A A, when he is at A."

Now, what are we to say to this? We do not expect to find grain without chaff: but this is *all* chaff. It is worse. It is an insult to the common sense of Englishmen. It is not only giving us a stone when we ask for bread: but it is telling us to look at the stone till we think it is bread. Mr. Olmsted would not have dared to tell us, that, by the act of "dwelling" upon a thing in a *downward* position, we could make it *truly* UP: so he tells us to dwell upon it "*until it APPEARS to us*" to be so! We look upon this as the very *height* of impudence. Thus, then, it is that *Astronomers* have arrogated to themselves the right of putting *their* interpretation to the pages of Nature's Book,—of putting *their* seal upon that which God has spread open for the use of common humanity. Thus, then, it is that "the great Book of Nature is absolutely sealed"—"to millions." Thus, then, we show that the very *foundation* of the "demonstrations" of which Lord Brougham speaks is worth nothing: and that, therefore, the "truths" which he says "rest" upon these demonstrations are worth less. Thus, then, we show that, if "millions believe" *these* things, millions have been deluded. Thus, then, it is that we show that the seal is a counterfeit and an imposition and a snare.

ENGLISHMEN! as we value the stability of our minds; as we value the foundation upon which our children's minds are to be built up; as we value Truth and beauty and harmony and consistency above their opposites;—we must examine this matter for ourselves. Let us see if we can find, in the whole area of Theoretical Astronomy, a single point where we may rest and say,—Thus far have we firmly advanced in the right path. Let us see if we can discover anything in *Theoretical Astronomy* to render it worthy of the name of a Science; or to lead us to imagine that the ideas upon which it is grounded are in conformity with Nature. Let us endeavour to act with a will that the *good* may always be *free*; and that the "great Book of Nature" shall be stripped of human encumbrances and petty seals. And, if we *do* this, we unhesitatingly affirm that we *shall* find that Nature's Book is open so that those who run may read; that the study of its pages—the astronomical ones amongst the number—will inspire "millions" of our fellow men with feelings of delight instead of filling them with disgust; and that, though it IS "sealed," in the minds of the people, the seal has been affixed by the guilty hand of arrogance and pride and perverseness and human nature, and not by the Hand of the Divine Author.

"THE LUNAR CONTROVERSY RAGES."

Astronomical Register.

The following Extract is taken from the *Astronomical Register*, for January, 1864. It is the Eighth and concluding stanza of a Poem communicated by Henry Perigal, Jun., from the pen of "a friend," for the edification of subscribers'--"sisters, wives, and daughters."

"A full investigation shows—
As every one who tries it knows,
And any one may ascertain
Who tests it thoroughly again—
The dogma of the Moon's Rotation
Admits of no substantiation.

Would Mathematics—forsooth—
If true, have failed to prove its truth?
Would not they--if they could--submit
Some overwhelming proofs of it?
But still it totters *proofless*!--Hence
There's strong presumptive evidence
None do--or can--such proof propound,
Because *the dogma is unsound*.
For, were there means of doing so,
They would have proved it long ago.

In fine--*the Moon does not rotate,*
If round the Earth she circulate:
But, *if the Earth revolves round her,*
She does rotate--as facts aver."

"P.S.--The doctrines I impugn
Are not restricted to the Moon!"

W. Carpenter, Printer, Greenwich.

THEORETICAL ASTRONOMY

EXAMINED AND EXPOSED:

By "COMMON SENSE."

TYCHO BRAHE.—From HENDERSON'S ASTRONOMY.

"TYCHO BRAHE, d. 1601 A. D.—The next Astronomer of eminence was the celebrated TYCHO BRAHE, a noble Dane; he was originally designed for the Church, and through life maintained religious scruples with regard to the nature and construction of the Universe. He invented a system commonly called 'THE TYCHONIC SYSTEM,' which held that the Earth was in the centre of the system, and was at rest; that around the Earth, as a centre, revolved the Sun and Moon in 24 hours, whilst the several planets revolved round the Sun as their centre of motion."

CONTENTS.

*The 'onus probandi' on the Astronomers' shoulders... An atmosphere "too sublime for vulgar comprehension" ... What we heard with our own ears ... Is water level, or is it not? ... Propositions of T. Webster examined... What a level surface really is... An observation by Mr. W. T. Lynn, of Greenwich Observatory... Ponds, Lakes, and Oceans level. The "true" and the "apparent" level of the astronomers... What is a spherical level? ... Its absurdity ... Joyce's Scientific Dialogues ... The Reverend gentleman says that "the true level is not a straight line, but a curve!" ... The "allowance" said to be made by surveyors for the supposed "curvature" of the Earth is not made and cannot be made. ... The Cat let out of the Bag ... Surveyors' Back and Fore-Sight... A Delusion or a Cheat... The surface of the Earth all TOP... Railways have a perfectly level Datum Line throughout... Common Sense versus Mr. Thornton ... Which end of a survey curves? Nobody knows! ... "You pay your money," &c.... Mr. Henderson and Mr. J. C. Bourne. ... Smeaton and Lighthouses... The new Brass Plate in the wall of the Royal Observatory, Greenwich Park... Southern Cross and Polar-star seen at one time—Impossible if the Earth be a globe... The **STANDING ORDER** in both Houses of Parliament puts a stop to the "allowance" for curvature... Another "Proof" of Rotundity gone... "Excelsior!"*

LONDON:

JOB CAUDWELL, 335, STRAND, W.C.

CHAPTER III.

It must not be imagined, even by the most commiserating, that, as the "proofs" of the Astronomers are severally put down from their proud position, the *onus probandi*, the burden of proof, is thereby taken from the Astronomers' shoulders. Not at all: the state of affairs is quite the reverse. If the sculptor should be corrected by the mechanic or the student, in some point of detail which he had overlooked or disregarded, would the sculptor consign the marble and the chisel to him who pointed out the error? No. If the father be put to his wit's end by some question from the child whom he is teaching, would he thereby be relieved from his duty to his child? No. In each case, additional duties will be recognised, if there be but integrity of purpose. Shall the astronomers, whose teachings we prove to be erroneous, be exempt from the rule which governs other men? We know not why they should. It is not too much for us to expect at their hands a system of Astronomy which, while it answers the purposes of the navigator, and the astronomer himself, shall likewise stand well for him who shall have launched his tiny bark upon the troubled waters of Truth's vast ocean. It is not too much to expect that, if a system is professedly adequate for the guidance of such a one, it shall be what it is said to be. It is not too much to expect that, when the teachings of the astronomers are clearly and undeniably proved to be insufficient and misleading, the astronomers themselves should know that it is *their* duty to find something better. We would not have it understood for one moment that the pathway to a better system has not yet been opened up, for we are even now upon this well-beaten track, and while we travel we are just sowing hemp seed by the way side, in order that, if we cannot build a handsome edifice or even erect the scaffold for the builder, we may at least be instrumental in providing the raw material for the ropes. It is our duty to keep on pulling down the premises of the poor unfortunate GALILEO GALILEI; and, though we are raising the dust about us, we shall, by keeping the mouth well closed, get through the dirty work uninjured, and leave a clear space for the erection of a new, albeit an old-fashioned structure. Some idea may be formed of the magnitude of the edifice which, though it is doomed, still exists, if we notice what Sir John Herschel says of it. In his work of more than four hundred pages he distinctly informs the reader that he need expect nothing more than to be placed "on the threshold of this particular wing of the temple of Science, or rather on an eminence exterior to it, whence he may obtain something like a general notion of its structure." In fact, Sir John Herschel thinks that he shall have rendered good service by "dissipating" the "obscurity" of the surrounding "atmosphere" which is spoken of as being "too sublime for vulgar comprehension." It may,

however, be found that some very dense clouds will yet have to be dissipated, and that there are people who think more of a single grain of *truth* than they would of a whole world of mere *sublimity*. It should be remembered, then, that we do not *presume* to take the chisel and the mallet from the hands of the sculptor, or to *teach* those who should teach *us*: or, in other words, whatever we *may* do, we repudiate at once and for ever the idea that because we promise to pull down a false system of Astronomy we are bound by any tie whatever to build up the true, *whilst we pay the astronomers for the doing of it*.

We have been told by one who boasted of having had fourteen years' study of the "sublime" science, that "The Earth *may* be a *many-sided* figure;" and this was said when we wanted to know the orthodox idea concerning the properties of the surface of water. Is water *level*? or is it not? That was the question. It was natural to expect an answer, though, certainly, difficult to obtain one. At last it came. It was as follows:—"Practically, *YES*; theoretically, *NO*." Now, if we had heard this with *anybody else's* ears, we should certainly have thought that it was a mistake; but we heard it with our own. And this is a sample of the teaching in "this particular wing of the temple of Science,"—a sample calculated, we should imagine, to keep people as far as possible from any desire to cross the "threshold."

If there be one thing above all others with which practical men are acquainted, it is the meaning of the word *LEVEL*. Every man, be he an artisan, a mechanic, or a labourer, has, perhaps, as clear ideas on this subject as upon any that it is possible to mention. Tell a man that you want a *level* surface, and he will never give you a *convex* one. He knows perfectly well that if water will run off from it it is *not* level; and that if, when he pours water on it, the water stays, it *is* level. A working man knows, likewise, that the *surface* of water, when that water is at rest, when it is in a state of equilibrium, or when it is *in its place*, is, to all intents and purposes, perfectly *level*. He knows that trifling *inequalities* of surface have nothing whatever to do with the *levelness* of it, but only with its *roughness* and its *smoothness*. Let the Earth, for instance, be what *shape* it may, the inequalities of mountains, if they be, as we are told, about the same in proportion to its extent of surface as the inequalities on the rind of an orange are to the extent of the surface of the orange, will be beneath our notice, and out of the question altogether. These things are, by the *ordinary* man, regarded as unquestionable facts, based upon the fundamental law, that liquids *will find their level*. But it is not thus with the astronomers. Where a plain man, knowing this law, regards it in its integrity, the astronomer has the right (or takes the liberty) to set it up that it may be knocked down again, as though it were a child's ninepin. We have but to refer to works on Hydrostatics to find that the authors of them show a similar disregard of the laws of nature, and that, in fact, they row in the same boat with the astronomers. As, then, this is the case, and we do not know the leader in this matter, we must regard one and all as being in the same predicament. If we take a work entitled *The Principles of Hydrostatics*, by Thomas Webster, M.A., of Trinity College (1847), we shall find certain propositions there laid down. Here is one:—"The

"surface of a fluid of small extent at rest is horizontal." Here is another :—"The surface of a fluid at rest is a level surface." Now, as between "level" and "horizontal" there is not a shadow of difference, it becomes a very natural enquiry why the surface of a fluid to a "small extent" only is said to be "horizontal," while the surface of fluid generally is said to be "level." Perhaps we shall find the difficulty cleared up in the body of the work. Let us see. In page 30, we read: "A level surface is one every point of which may be considered as situated at the same distance from the centre of the earth." Well, then, if these words mean anything at all, bearing in mind that the author believes the earth to be globular, they mean that a level surface is the same as the circumference of a globe. Now, everybody knows that such a surface would be a convex surface, and not a flat, level, or horizontal, one. So that, although the surface of water has been said to be "horizontal" or "level" (to make quite sure of the matter), it is now to be distinctly "considered" as CONVEX! The word "level," as applied to the surface of anything, means that it is flat or horizontal—a surface which does not fall from one direction on any side—a surface practically, theoretically, and invariably one and the same thing—a plane surface, and not a spherical one, just as a spade is a spade, and not a rake. Here, then, lies the difference between plain men and astronomers—ordinary and extraordinary men; the one class considering "level" to be level, and the other considering it to be level, convex, many-sided, practically level and theoretically not so; or, in fact, any other kind of surface that the exigencies of the case may require. The earth is said to be a globe; the surface of a globe must be convex; water abounds on every hand, and is said to lie on the surface of this imaginary globe,—therefore, water must be convex. But water is level! Admit, then, that level is convex, and convex is level, and all will be right! But is it really a fact (it may be said) that this kind of process is common with astronomers! O, yes: it is impossible, under the existing state of things, for it to be otherwise. If a theory be, inherently, as bad as we show that the theory of the astronomers is, very many extraordinary and outrageous mental processes must necessarily be employed in order to sustain it for even a brief period of existence.

If we refer to a little work entitled *The First Principles of Natural Philosophy*, by Mr. W. T. Lynn, of the Royal Observatory, Greenwich, we shall find a statement respecting the surface of water, at page 51, which will be found to be interesting of itself, and doubly interesting if we compare it with those statements which we have just referred to. It is as follows:—

"The upper surface of a fluid at rest under the action of gravity alone is a horizontal plane, since otherwise, if a part of the surface were higher than the rest, those parts of the fluid which were under it would exert a greater pressure upon the surrounding parts than they received from them, so that motion would take place amongst the particles and continue until there were none at a higher level than the rest, that is, until the upper surface of the whole mass of fluid became a horizontal plane."

Thus, then, we are shown, very clearly, that the surface of "the whole mass of fluid" is, of necessity, "a horizontal plane." And there is no doubt about it. Ponds and lakes, seas and oceans, must, therefore, form horizontal planes. And this inference is legitimate. It is to be hoped

that Mr. Lynn will never attempt to prove the Earth to be a globe; for, in such a case, the facts he has already published would certainly rise up against him, and prove much too stubborn to be overthrown. Therefore, we say, from such indiscretion may he be preserved.

In the *Encyclopædia Britannica* we find the following remarks on the nature of a *level surface*:—"A line drawn at right angles, crossing the "direction of the plumb-line, and touching the earth's surface, is a true "level only in that particular spot; but if this line which crosses the "plumb be continued for any considerable length, it will rise above the "earth's surface, and the apparent level will be above the true one, because the earth is globular; and this rising will be as the square of "the distance to which the said right line is produced; that is to say, "however much it is raised above the earth's surface at one mile's distance, it will rise four times as much at the distance of two miles, "nine times at the distance of three, &c. This is owing to the globular "figure of the earth; and this rising is the difference betwixt the true "and apparent levels; the real curve of the earth being the true level, "and the tangent to it being the apparent level."

It requires but little consideration and still less common sense to see the inconsistency of these explanations with the true state of things. We find it stated that a line is a "true level only in that particular spot" where it touches the surface of the earth—a surface supposed to be spherical. Now it is well known that a straight line can only touch a circle in a *point*; and therefore "that particular spot" must not be supposed to have length or breadth, for it can have neither. It is but a *point*; and to talk about a point or a "spot" being level, and a *true* level into the bargain, is an absurdity which anyone would think too glaring to be perpetrated and tolerated by geometers. Again, we are told, that "if this line which crosses the plumb be continued for any "considerable distance, it will rise," and so on; or, in other words, that that which invariably maintains its direction will *alter* it, which is at once contradictory, impossible, and absurd; and this, too, if it be "continued for any considerable distance," which is, certainly, *suggestive* of no conceivable distance whatever. Again: "the apparent level will "be above the true one." There are *two* levels, then, the "apparent" and the "true!" But *apparent* is not the opposite of *true*. A thing *may* be true and not apparent; or it may be true and apparent also. If we imagine a person dividing a company of young people into *boys* and *children*, it would just be a parallel case; for, certainly, whilst boys *may* be children, it would be a great pity if all children were boys. Again: *apparent* is sometimes used by astronomers to mean *true*. We have only to refer to the *Astronomical Register* for July, 1864, to find an article by E. Hopkins, C.E., F.G.S., in which the cause of the Sun's variable diameter is so positively stated that the author asserts, upon the strength of it, that KEPLER himself was misled concerning the "ellipticity of the earth's orbit," which, he says, is founded on an "optical illusion:" and yet this article is headed: "The *apparent* Cause "of the Sun's Variable Diameter." It has been said that words are but wind: but, sometimes, momentous consequences result according to the *way* in which this wind blows. One thing is quite certain:—

The *false* alone can be ranged against the *true*: so that if there be two things, and one only be true, the other must be false. But we read: "the real curve of the earth" is the "true level!" So that the "level" surface (which really maintains its character, though it has been said to rise) is, consequently, made out to be a *false* level; and a convex or spherical surface (maintaining its distinguishing characteristics likewise) is distinctly *said* to be the "*true level*." But we may glean a little truth from this, after all. The *level* which everyone understands as level is said to be the "apparent" level. And so it is. As to the other one, the *spherical level*, that, of course, is, on the contrary, *not* apparent. And, truly, it is not. For, if the *true level* be not a *plane*, it would puzzle all the lexicographers in the world (and the astronomers to boot) to show that it may, by any possibility, be a *sphere*. The surface of a sphere may be *called* "the *true level*" till people really believe it to be so; but, before it be *demonstrated* that such a thing can be reasonable or true, reason must cease to be *reason*, and truth, *truth*.

Almost as familiar as household words are *Joyce's Scientific Dialogues*. In the work which bears this name, we find it stated, in page 76, that "the true level is not a straight line, but a curve which falls below it "eight inches in the first mile." Now, as to what a *false* level is, the work in question says nothing. But it is ridiculous to look for consistency in papers on Astronomy. The Reverend author says: "it is "necessary for those who are employed in cutting canals to make a "certain allowance for convexity, since the true level is not a straight "line," and so on. Now, let us examine this, and take nothing for granted that will not stand the test. First, then, as to what is to be understood by "a certain allowance for convexity." *Practically* speaking, an "allowance" is an alteration made in a particular state of things. Whether this alteration be to a "certain" extent or to a very *uncertain* extent, or whether it be really made at all, are matters which will be very clear by and by. It is the *theory* which concerns us now. *Theoretically* speaking, then, an "allowance" is that which would tend to cause a *deviation* from any particular line of conduct. Very well. Those who cut canals are on the surface of the earth, and a "true level" lies before them. What more can they require? Is it "necessary" that they should deviate from the true level, for the purpose of finding some level *other* than the true, just as it appears to be necessary, sometimes, to deviate from *words* that are true to others which are not? A deviation, in the case before us, must be either for the purpose of finding something not to be found on the surface, or, for the purpose of getting rid of something found there. What, then, is the difficulty concerning the surface of the earth, since, by the author's own admission, it is a "true level," and this is just what is wanted? As though it were likely that men can be found, *practically*, to deviate from the very thing they *do* want, to find something they *do not*! If we understand the words of the author, the difficulty is nothing more nor less than "convexity!" How, then, can this convex surface be a "true level?" or, if the surface is a "true level," how can it be "convex?" No answer can be given. The Reverend gentleman's words are contradictory. If the Earth's surface be convex, "those who are employed in cutting canals" would,

certainly, find it *quite* "necessary to make a certain allowance," and a very liberal allowance too; but if, on the other hand, it is a *true level*, they can have to make no allowance whatever. There is a very common notion amongst astronomers, and the people seem to be taking hold of it, too, that if a thing has to be proved there must be a host of "proofs" in order to do it. This is a very great mistake. One astronomer, of whom we have not hitherto spoken, actually brings forward a "proof" of the Earth's rotundity which he calls "*perfect*," and then immediately afterwards brings forward two or three others concerning which no claim to perfection is put in: a sufficient hint that they are all *imperfect* together, and *altogether imperfect*; and, therefore, that they would not constitute one PROOF if they were all put together. Now, on the *other* hand, no such difficulty is presented. For, while any number of proofs that the Earth is NOT a globe can be easily obtained, each one forming a separate link as perfect as any other link in the chain, the whole of them, when they shall be united, will form a chain which shall stand all the powers that can be leagued against it. Here, then, we come to another link. We have seen that the *true level* cannot be convex; and that the surface of the Earth is a *true Level*; therefore, the surface of the Earth cannot be convex, and the Earth cannot be a globe. This single link is incomparably stronger than the whole chain of argument on the opposite side of the question: it is of itself a *proof*; and, if no other could be found, it would be quite sufficient.

But we have a little more to say about this *allowance*, and the assertion that it is *necessary*. If it be necessary, we need not add a single word. This would be a PROOF of the Earth's rotundity; and we ask for nothing more. Unfortunately for the people, Treatises on Land Surveying are not much in requisition; they are not household words; for the simple reason that the people are more labour-lords than land-lords. Be this as it may, there is a work by Robert Thornton, Civil and Practical Engineer, entitled *Elementary Treatise on Land Surveying and Levelling*, (1863). This book is profusely illustrated, and printed by the Queen's own printers. At page 99, we find a section headed thus:—"Correction for Curvature." It is here stated what the amount of "curvature" is; or rather, we would say, what it is *supposed to be*. Of course, this amount is made to agree with the supposition that the Earth is a globe 24 or 25 thousand miles in circumference—a difference of a thousand miles being incidental to the various ups and downs of this "sublime" science, and a matter of very little moment. We have seen, in *Joyce's Scientific Dialogues*, that it is *eight inches* in the first mile. Now, as we do not intend, if we can help it, to have any disputes about this "eight inches," we must dwell upon it for a moment. In the volume before us, it is stated to be "*nearly eight inches*." It is possible, however, for this "*nearly*" to be made a thing of great import unless we prevent it. Well, then, how much short of eight inches is it? Our author, Mr. Thornton, states that it is 7·965 inches, which is, in plain English, seven inches and nine hundred and sixty-five thousandths of an inch, or, in other words, thirty-five thousandths of an inch short of eight inches. But he has arrived at this amount by *supposing* the Earth to be a globe with a diameter of 7958 miles. We have seen,

however, that Dr. Comstock has given us 7914 miles as the measure of the Earth's supposed diameter ; so that if, with *this* diameter, we adopt the system which has been followed by Mr. Thornton, we shall find that, instead of the amount of curvature for the first mile being *under* eight inches, it will be *over* it. So that nothing whatever need be said about this matter. It must now be distinctly understood that, according to the scientific men of the day, from any place where we may happen to be situated, to any other place a mile off, there is a fall of eight inches owing to the curvature of the Earth, irrespective, of course, of accidental inequalities such as are compared to the dimples on an orange. And it must also be understood that this curvation is *always* a *fall*, and *never* a *rise* ; for astronomers would not dare so much as to tell us that we are not *always* on the *top* of the Earth, although they tell us that the Earth is a globe, and are utterly at a loss for any explanation whatever as to how it is that, go where we will, we find ourselves as we are. "Well," it may be said (for it *has been* said), "suppose that the Earth *does* curve eight inches in the first mile, why, the amount is a mere *nothing* compared with the *vast* extent of the Earth's surface." But, we have seen what the *Encyclopædia Britannica* says about this, namely, that the amount of curvature increases "as the square of the distance:" so that, at the distance of two miles, the fall would be 32 inches, that is, *four* times the amount of the fall in one mile, because the square of two is four ; at three miles the fall would be 72 inches, or *nine* times the amount, because the square of three is nine ; at four miles, *sixteen* times the amount, or 10 feet 8 inches ; and so on. It will be seen, then, at once, that the objection that the amount is (or would be) a *mere nothing*, falls to the ground. If we take the length of Great Britain as 600 miles, there would be a fall of more than forty miles from a straight line *at one end or the other* ! Well, then, as this amount is a *very considerable* one, and as it *cannot be discovered* by the senses of man to have any real existence at all, it will be seen that if anything could be found to *reduce* it, it must tend to make the doctrine *somewhat* more feasible ; and, we may depend upon it, the astronomers would hail as a great boon something that would wipe it off altogether, and save them from all further annoyance concerning a point of their theory which, like all the rest, can neither be understood nor explained. However, we find that the total amount for curvature in any particular distance is said to be *reduced* by one-seventh for *refraction* ! We find this at page 100 of Mr. Thornton's book :—"The correction varies with the state of the "atmosphere, and it may generally be taken at about one-seventh of "the correction for curvature, since refraction makes objects appear "higher than they really are." At page 101, however, we read thus :—"To correct the error arising from refraction, we have only to "diminish the effect of the earth's curvature by one-sixth part." And as the whole subject is in *sizes and sevens*, it is but reasonable to expect to be allowed a choice between a sixth and a seventh, especially when we know perfectly well (and intend to prove it) that neither one nor the other is of any practical service whatever except that of mystifying and misleading a too credulous public. But when we read that "we "have only to *diminish the effect of the earth's curvature*," we read that

to which no meaning legitimately belongs, whatever meaning may by some people be attached to it. Who can *diminish* an effect? An effect is a *fact*, and we cannot *diminish* a *fact*; it must remain a *fact* through all time, do what we may with it. But the "curvature of the earth" is such a thing that with it all manner of tricks can be performed *save* one of great importance, namely, that of *making* a *FACT* of it. But we are reminded by Mr. Thornton that "*Refraction makes objects appear higher than they really are.*" Just so. If we put one end of a stick into a pond, the end thus immersed will *appear* to be higher than it really is; so that if we, *for any practical purpose whatever*, had to allow for this, we should have to *add* to the distance if it were the *apparent* one which we were considering; and, if we had the means of getting at the *real* distance of the end of the stick from the surface of the water, irrespective of mere *appearance*, what would there be either to *add* or to *take away*? Nothing at all. To take either step would be to take a wrong one. And now for the case in point. The Earth is said to curve at a certain rate in accordance with its size; what, then, has any *appearance* to do with the rate of curvature, if it be known to be a certain amount, and this certain amount be known? But the fact is that any port will do in a storm. The amount for "curvature" is so monstrous and so evidently untrue on paper, that on paper must it be *reduced*, whether it be right or whether it be wrong. So then we find that the amount of the Earth's *supposed* curvature, after having been fixed at eight inches in the first mile, has one-seventh cut off from it for no other purpose than that *it shall be less*. Mr. Thornton now gives examples. Here is one, or, rather, the substance of one. The distance of a certain visible point (the top of a rock) is four and a half miles in a horizontal line from the eye of the observer: what is the "allowance" which it is supposed to be "necessary" to make if the surface of the ground has to be considered? We are told: thirteen and a half feet for curvature, from which one-seventh or nearly two feet is taken for refraction, which makes a little over eleven feet and a half for the amount of "curvature" as it stands after it has thus been "corrected" for "refraction," by *taking from* the amount instead of *adding to it* as would unquestionably have been necessary *if any alteration had been needed at all*. Once more we must urge this point, that there may be no possibility of any misapprehension arising:—Is it not perfectly clear that if, as in the case given, the top of an object appear level with the eye, and its base thirteen and a half feet down below this level in consequence of the Earth's "curvature," and, in consequence of something else, distant objects *appear higher than they really are*, the object in view must be, in fact, *lower down than it appears to be*, and, therefore, that just so much (whatever the amount may be) would have to be *added* to the amount as it stood at first? But it does not matter to us that surveyors and astronomers thus amuse themselves, except inasmuch as that the amusement is being carried on at *our* expense, both material and mental; so that, in this case, while it pleases them, we cannot say that it is at all gratifying to *us*.

And now, just to show the immense power of "refraction," in the eyes of scientific men, we must refer to a paragraph which appears

in *Tallis's Literary Newspaper* for June 11, 1864, and which is as follows :—

"**TERRESTRIAL REFRACTION.**—An extraordinary instance of this phenomenon was lately witnessed by a party of Portuguese philosophers in effecting the ascension of the Peak of Teneriffe. On their reaching about sunrise the top of the volcano, which has the shape of an enormous pyramid, and an altitude of 2,000 metres above the level of the sea, they were astonished to perceive at the horizon masses of mountains which could not but belong to some vast continent. The archipelago of the Canary Islands was at their feet, as it were, and it was therefore impossible to mistake the appearance at the horizon for these; and one of the tourists, who had been in North America, at length recognised the Alleghany mountains, which were at least 2,500 miles from the spot. This spectacle was due to a singular effect of mirage, or terrestrial refraction, produced by the moist W.S.W. wind which blew at the time. As the utmost extent of vision which can be obtained from the top of the Peak of Teneriffe is not more than 150 miles, the distance supplied by refraction was in this case not less than 2,350 miles."

It will at once be seen that, supposing this to be true, the Alleghany mountains were *really* much *lower down* than they *appeared* to be; and that, in fact, when "refraction" gets a little stronger, we may reasonably expect to hear that, in the event of some extraordinary South "wind" springing up, the Australian continent itself will be brought entirely "up" from its supposed position, and our "antipodes" be antipodes no longer. So much for *theoretical* "refraction!" One practical experiment in which two distinct media, such as the *air* and the *water* in the case of the stick in the pond, are taken into account, will give rise to ideas worth serious consideration, which is more than can be said of such "refraction" as that which we have been examining. Well, then, what says Mr. Thornton concerning this "correction for curvature" which now stands corrected, in the accredited form, upon the erroneous assumption that an *appearance* can be made to affect a *reality*? At page 103, we read as follows :—"It will be proper to state, that the "corrections for curvature and refraction already explained are seldom "applied in the practice of levelling (excepting in taking very long "stations one way), the spirit level being placed midway between the "stations; hence the resulting corrections for each station are equal, "and therefore the difference of the levels of the two stations is as truly "shown by the difference of the readings of the two staves fixed thereon, "as if the corrections had been made. Thus the trouble of making "these corrections is avoided by simply placing the instrument midway "between the two staves." Every one has heard of the cat that somehow or other got out of the bag; but the opportunity of watching the exit of the said cat is but rarely afforded. Here, then, is the cat in the very act! After all this trouble about the Earth's "curvature," and then all the trouble of getting it correct—*correct* to the one thousandth part of an inch—it is, we find, *in practice*, "seldom applied;" and, in fact, in consequence of a little of what will presently be seen to be sheer *hocus-pocus*, Mr. Thornton says that "the trouble of making these corrections is avoided." "*To be, or not to be, that is the question!*" If the Earth be a globe, these allowances or corrections must be "necessary;" if the Earth is *not* a globe, they are not. Which is it? If, now, we just take, not the "bull" by the horns, but, the cat by the claws, we shall find that in a few minutes it will be "out of the bag" altogether.

The first thing we notice is a glaring fallacy which stares us in the

face. We find it stated that the method adopted whereby "the trouble" of making these corrections is avoided," is, "simply placing the instrument midway between the two staves." A *simple* process, to be sure; and *simple* indeed must be the Simon who believes that any such cause will be followed by any such effect. What wonderful instrument is this which sweeps away so great a difficulty at so little cost? "*Simply placing the instrument between the two staves!*" What would this do? A broom is useless without the *motive power*, and the *thing to be done*. Let the housewife place her broom in some peculiar position, will that sweep away the dust? What instrument is it, then? Has it *life*? Can it *think*? or think, *act*? Is it of man's construction, or God's creation? If it involve some stern, uncompromising, *sweeping principle*, it would be of great service, to remove the accumulations of centuries, which are at present but marked with the finger of scorn or disgust. But no: it is but a telescope—a telescope with spirit-level and other mechanical appliances by which it can be adjusted with accuracy to the required position; it is mounted on three legs; and is known as the *theodolite*. So much for the "instrument," and now as to the staves. A levelling staff is a rod commonly made about 6 feet long, and so that it may be extended to 12 feet; with divisions marked throughout its entire length, showing the number of feet and inches, beginning at the bottom. If, now, we have to find the difference of level between a spot of ground where we are situated, which we will call A, and a spot at any distance off, which we will call B, we can erect the staff at B, look through the telescope which has been fixed perfectly level at A, read the figures on the staff, and the difference between the height seen on the staff at B and the height of the telescope from the ground at A is the difference of level between the two stations. This result is obtained by looking in *one* direction. Suppose, now, we erect a staff at A, retain the one at B, and place the theodolite "midway between the two staves," and look *backwards* at the one and *forwards* at the other, will there be any difference in the result? Certainly not. Let us see this clearly. If, in the first case, the height read off from the staff was 10 feet, and the height of the theodolite was 6 feet, there would clearly be 4 feet difference between the level of the two stations, B being lower than A. If, in the second case, the theodolite were placed "midway," and at any distance below the original level, say two feet, then the height on the staff at A, by what is called the "*back sight*," being 4 feet, and the corresponding height on the staff at B being necessarily two feet less, will likewise, by what is called the "*fore sight*," be 8 feet, so that the difference of level is again proved to be 4 feet, as at first. And where, now, is the effect of "simply placing the instrument midway between the two staves?" Clearly, nowhere. Therefore, as nothing has been cleared away, as no alteration has been made, as no earthly difference *can* be found between the results of looking *one* way and looking *two*, under these plain circumstances, no difference whatever will be made in any other such cases; and the practice of "simply placing the instrument midway between the two staves" is thus shown to be a delusion or a cheat. It is evident, then, that this scheme of "*back and fore sight*," as it is called, is *not* calculated to save the "trouble" of

making "Corrections for Curvature," *if there be any such "corrections" to be made at all.* But we read in Mr. Thornton's book that these "corrections" "are seldom applied" "*excepting in taking very long "stations ONE WAY."* We have heard a little about "*one way*" before. In *this* case, however, there is no question as to *which* way the author means; and we have already seen that there is no difference whatever in the results obtained from using the theodolite in *one* way or in *the other way*, and we may be sure that Mr. Thornton himself would not attempt to point out any. However, we will allow Mr. Thornton to have his *own* way, and we will follow him, that he may show us whether these "corrections" are "*applied*" *under any circumstances whatever*; for it is important that we should know. But there is a consideration which forces itself upon us here. We have seen a grand *distinction* made where no *difference* exists. How is this? It is owing to the wild and incoherent theories which deluge the world, and through which the grossest inconsistencies must necessarily arise. An *educated* man is standing on some part of the Earth's surface, which we call A, and he reasons thus:—'The Earth is a globe; I, like everyone else, stand on 'the top, (for, certainly, there is no earth above me); this globe, then, 'necessarily curvates downwards at a certain rate, say, in the first mile, '8 inches, in the second 32 inches, and so on. If, now, I travel half way 'to a point, B, a mile off, I shall still be *on the top*, and the extent of 'surface betwixt A and B will curve 4 inches down to B, and 4 inches 'down to A!' Thus reasons the Surveyor; and, therefore, he says that by "simply placing the *instrument* midway between the two staves" the "resulting corrections for each station are equal!" Beautiful *theory* this! But what says Common Sense? If the Earth were a globe, and a philosopher stood at any point, call it A, and the surface did *in truth* curve downwards to a point B, then might the philosopher travel half the way or *all* the way to B, *but he must go DOWN.* Let him go down, then, and *he shall BE down*; and, to the point A, be it never so short a distance, *the surface must RISE.* 'But,' says the philosopher, 'it 'falls!' Ask him how this can be true or possible, and he can say no more. *It is utterly impossible* for the Earth to be a globe, and for all to be *on the top*; or for a man to travel *from* a place, the top, *to some other place*, the top likewise. As there is but one place on a small globe which can be called the TOP, so there can be but one place which can *truly* be called the top be the globe *never* so large. Imagine man to have the power to throw off globes of various sizes into space; see them rise, larger and larger still! Is there a man to be found, except he be labouring under strange delusions, who would imagine that when these globes should attain a certain size one should be so large as to be *all TOP*? Absurd. Is there a man to be found who would imagine that although on the small globes living creatures could not exist because of the *shape*, that, as the globes grew *larger*, the difficulty would get *less*? that because the *size* was more extensive the *properties* would be non-existent? Surely not. We might just as wisely talk about increasing the *size* of a boy and making a man of him. Is there one to be found who can imagine that just because the Earth is *so large*, it can be a globe, *without possessing the PROPERTIES* of a globe, and that it is so

very large—so “vast”—that wherever we go we shall find nowhere but the top of it anywhere? Strange though it may seem, this is the very assumption upon which Mr. Thornton’s arguments are founded! Let us see, then, how Mr. Thornton proceeds. It is in this wise. After he has given us the rule, he favours us with examples. And sure enough there is no “allowance” whatever for “curvature” in the several examples he lays before us! One of these examples, Mr. Thornton informs us, is “part of a contract section of a railway,” and “will,” he remarks, “illustrate the whole process of levelling and plotting, as practised by “the most scientific engineers.” More than *seventeen miles* is the extent of this particular survey, and there is not a single inch allowed for this much talked of “curvature!” And why is this? Because, forsooth, the “*back and fore sight*” plan has been adopted. But, as we have already shown that this is sheer nonsense, it follows that there was no “allowance” of any kind to be made, and, therefore, no curvature at all in the whole seventeen miles! Whereas, if the Earth were a globe, in seventeen miles, according to the accredited rate of curvature, there would be a fall, *at one end or the other*, of more than 192 feet! And now Mr. Thornton gives us an illustration just to show us that, when the *straight-forward* plan is carried out, the “allowance” has to be made in so many figures, thus forming part of the surveyors’ arithmetical calculations. We must bear in mind that this example is to illustrate the *exception* to the general rule, or, in other words, the method to be used “*in taking very long stations ONE WAY.*” Now, then, let us see. In the first place, the distance is *three quarters of a mile* only: a distance not so “very long,” after all. But let this pass, and we will describe the case in detail, as though we were engaged in it. Here, then, we stand with our theodolite placed at the margin of a pond which is ten feet in depth; the instrument itself being 4·8 feet (four feet and eight-tenths) in height, in so far as the telescope is concerned, above the water. The object, then, is to drain the water from this point, A, “into a stream at “B at a distance of 60 chains.” As 80 chains go to a mile, the distance is three quarters. Of course, yonder stream is *lower* than this pond—lower than the *bottom* of the pond,—or we need not attempt to drain the water into it. The question is, *how much* lower is it? This we want to know in order that a *regular* water course shall be made. Take Mr. Thornton’s own words for it. He says, “What is the difference of level “between the bottom of the lock or pond and the surface of the stream?” A very simple matter, this. There is a staff being “held upright, at “the side of the stream at B.” The “line of sight,” Mr. Thornton admits, is a “level line;” and, as we look through the telescope at the staff, we read from it 15·84, (fifteen feet and eighty-four hundredths of a foot.) Now, then, we have it. The height of our telescope above the water at our feet is 4·8 feet; and the depth of the water, 10 feet. Add these two amounts together, and take the sum from the height shown on yonder staff, and the difference shall be the answer to the question put. So says Common Sense. *Not so*, says Mr. Thornton. We know what is said to follow “when Greek joins Greek;” and, certainly, here is antagonism fully developed. We shrink not, however: for “Truth is ‘mighty, and will prevail.’” What we say is this:—that the answer

to the question is, 1·04 (one foot and four hundredths), and that there is no reason why it should be said to be either *more* or *less*. But Mr. Thornton says that it is 0·72 (seventy-two hundredths) only. And how is this? "*Correction for curvature and refraction for 60 chains, 0·32*" (thirty-two hundredths), says Mr. Thornton, and straightway cuts it off. Mr. Thornton! how is it possible that you can alter a *fact* without making a *fiction* of it? Why cut this amount off *the other end* of the survey, when the fact is that if you stood there you would cut it off *this* end? just as in the youngsters' game of *seesaw*, when Jack goes down, Jill goes up, and *vice versa*. Why cut it off at all? why not put it on? If you alter the true statement of the case in any way whatever, the result must be false. You *have* altered it: and the consequence is that your example falls to the ground; no one can use it; and there it lies, a creature of imagination, whilst the seventeen miles of levelling without a fraction of an inch put on or cut off for "curvature" stands as a recognised and established fact. We have seen, then, that all this trouble about allowing for "curvature" is to no purpose, and amounts to nothing: for it must be admitted that the evidence brought forward by Mr. Thornton himself, to support his original proposition, is not worth so much as the paper upon which it is printed; and so far is it from being a fact that these "corrections" are affected in the smallest degree (as Mr. Thornton says) by the state of the atmosphere, it is quite evident that the most clear-sighted individual in the brightest sunshine that ever warmed his heart would fail to discover the least sign of any "Correction for Curvature," except in the fertile imagination of the astronomers and surveyors.

There is a work called *A Treatise on Astronomy*, by E. Henderson, F.R.A.S., which treats, most fully, of the *Arithmetical Architecture of the Solar System*, and in which we read as follows:—"A canal 5 miles in length will have a depression of 16·531 feet; that is, the eye being placed on a level with its water at one end, a pole 16½ feet high erected perpendicular at the other end will just be visible; its top will appear like a point on the surface of the canal 5 miles off." Here, then, is a case where (if we take the author's meaning, and overlook his curious language) we are plainly told that in a distance of five miles there will be more than 16 feet of curvature or "depression," *at one end or the other*! A very natural question arises, namely, *Which end?* since it is impossible, and absurd to suppose, that *both* ends can be at one and the same time 16 feet lower than each other! Now it is a fact that no *reasonable* answer could possibly be given: so that the answer which the showman gives to inquisitive juveniles would be quite appropriate here. When this gentleman is asked for instance, which, out of a number of figures, is intended to represent the Duke of Wellington, he says, '*Which ever you like, my little dears: you pay your money, and you take your choice.*' Mr. Henderson says, "A steam-boat, the top of whose funnel is 66 feet above the level of the sea, will, at the distance of 10 miles therefrom, appear on a level with the surface of the water." What Mr. Henderson intended to say, was, that the *top of the funnel*, if it be 66 feet high, will appear on a level with the surface of the water, at 10 miles distance: thereby endeavouring to show that, in 10 miles, the water

curvates 66 feet. Mr. Henderson says, moreover, "Under these circumstances, Trigonometry can determine that the steam-boat must be sailing on part of a curve whose radii is 4000 miles nearly." Now, Trigonometry may be very clever; but what says Mr. J. C. Bourne, in his magnificent work called *The History of the Great Western Railway*? He says, concerning this Railway, which is more than 118 miles long, "The whole line, with the exception of the inclined planes, may be regarded practically as level." The truth, and the whole truth, is, there is no "curvature," or "depression," or anything of the sort, to be found, and, consequently, there is none to be allowed for, and surveyors cannot, therefore, make any allowance whatever. We have but to look around us to find proofs of this in abundance; they exist everywhere. Take, for example, the various lighthouses in all parts of the earth: one illustration will, however, do as well as fifty. If we turn to a work called *Smeaton and Lighthouses*, we may read as follows, concerning the cast-iron lighthouse on Morant Point, in the island of Jamaica:—"The Admiralty notice which announced the light for exhibition on the 1st November, 1842, states that the centre of the light is ninety-six feet above the level of the sea, and in clear weather the light can be seen from a distance of twenty-one miles." Now, if the earth were a globe, and of the size it is said to be, the amount of curvature in 21 miles would be 294 feet. This is the amount of "curvature" as regards the surface of the earth. As the light is 96 feet high, we must take 96 feet from the amount of curvature, which gives 198 feet; and as we may suppose that the light is seen from the deck of a vessel at sea, say 20 feet above the water, we must take this amount, also, from the original distance, and we shall have 178 feet as the distance which this light would be "depressed" below the line of sight! But is this a fact? Not at all. There is no evidence in existence to show that from the mast-head of the noblest vessel that ever sailed there is a "depression" of a single inch from the line of sight between the eye of the spectator and the light of the most insignificant structure that ever bore the name of lighthouse, even though it were distant fifty miles instead of twenty-one. The light on Morant Point may be visible at a distance of twenty-one miles; but it is on a level with the eye! In the fifth volume of the *Arcana of Science and Art*, we find that, in February, 1830, J. A. Lloyd, Esq., F.R.S., received directions to survey the river Thames, to ascertain the difference of level between certain parts of it and the main level of the sea at Sheerness. In the account of this matter we read as follows:—"By the kindness of Mr. Lubbock, the author was furnished with 'the results of 26 years' observations on the tides at the London Docks; from which it appears that the height of mean high water mark there, above that of Sheerness, is 2.24 feet.'" Two feet and twenty-four hundredths of a foot! It is needless to make any observations upon a fact so plain as this. Those persons who are in the neighbourhood of the Metropolis have but to ascend the great Tower in the grounds of the Crystal Palace, and look around on every hand, and mark well the distant horizon which surrounds them, on a perfect level with the eye, to be convinced that, if the earth be a globe, at all events the Tower is situated in the centre of a section of it which, as far as the eye can reach,

is level enough for anything. But, in order to be satisfied that this is in no wise out of the regular order of things, a visit should be paid to the noble old Park at Greenwich; and there, on the wall of the Royal Observatory, may be seen a brass plate with an inscription—a capital inscription! We read that a certain horizontal mark on the wall is "1540 FEET ABOVE MEAN WATER AT GREENWICH," and "155·7 FEET ABOVE MEAN WATER AT LIVERPOOL." Of course those by whose authority this statement is exhibited have a *theory* all ready cut and dried to explain it. But let us look at the *facts*, and understand clearly the import of them. The horizontal mark in question is *just one foot and seven-tenths higher above the water at Liverpool than it is above the water at Greenwich*; or, in other words, *the water at Liverpool is just one foot and seven-tenths lower than the water at Greenwich*! Is there any "Correction for Curvature" *here*? we exultingly exclaim. Not the shade of a fraction of an inch. And just compare this fact with what Mr. Henderson, at page 139, says is the effect of the "curvature" of the earth. He says, "Strictly speaking, the fronts of the houses on 'the opposite sides of a street are not parallel, being a minute fraction 'of an inch wider at their top than at the ground.'" But let us not be allured by such abominable trash as this: it is highly injurious to the mental faculties of those who imbibe it. Again, the fall in the large rivers on different parts of the earth's surface is but a few hundred feet in any case, though the river may be thousands of miles in length. If we examine the reputed elevation of the immense lakes of America above the *level* of the Atlantic, we shall find a gradual diminution from the highest to the lowest: Lake Superior, for instance, being 627 feet, and Lake Ontario 231 feet, above this level. And again, we read so much about the water on the earth partaking of the shape of the earth. Of course it does. But look at a pond on a heath: is there any *curvature* there? Look at the lakes of Cumberland: are *they* not level? And shall not the lakes of America be level? Shall not the mighty Atlantic be level? He who speaks of *curvature* must *point it out, somewhere—anywhere—everywhere*,—for there is but one law about the surface of fluids, from the water of Lake Ontario to the infusion in the tea-cup. But again, what is the fact? If we look in the *Times* of May 13, 1862, in the *Naval and Military Intelligence*, we may read as follows:—

"On the 19th of April, in latitude 23.53, longitude 35.46, Captain Wilkins reports that the Southern Cross and the Polar Star were both distinctly visible at midnight."

In the event of this being considered as an error of some kind, we may state that we have heard from the lips of Captain Edward Gillett that he has observed the same thing between the 12th and 13th degrees of South latitude. Why, if there were any *curvature* such as that of which we read so much, the whole thing would be an impossibility instead of a well-authenticated fact. But we have heard—and let it stand for no more than hearsay is worth, though we have reasons for giving credence to the assertion—that allowances have really been made for "curvature" in the construction of one of our railways, and that much labour was thrown away in consequence. Be this fact or fiction, it matters little: for certain it is that if such a thing *were* done, such results *must* follow. But *the law steps in*! There is a "Standing Order," for this matter, in

both Houses of Parliament, which positively *forbids* the thing to be done. Here it is:—

“Ordered, by the Lords spiritual and temporal in Parliament assembled,—

“That the section be drawn to the same horizontal scale as the plan, and to a vertical scale of not less than one inch to every one hundred feet, and shall show the surface of the ground marked on the plan, the intended level of the proposed work, the height of every embankment, and the depth of every cutting, and a datum horizontal line, which shall be the same throughout the whole length of the work, or any branch thereof respectively, and shall be referred to some fixed point stated in writing on the section, near some portion of such work, and, in the case of a canal, cut, navigation, turnpike or other carriage road or railway, near either of the termini.”

Aye, this is—the *point*, we were going to say, but it is—the *LINE* to be considered: the *DATUM HORIZONTAL LINE* is that which *puts a stop* to anything like an “allowance” being made for “Curvature,” should surveyors even attempt such a thing. And, to prevent any chance of mistake arising, there is a diagram to render the whole matter plain to the meanest capacity. And further, to show its importance, we may remark that it is the only diagram in the book of “Standing Orders,” and the “Datum Line” is as perfectly level as it can possibly be made. And further still, we must remark that, unless it be imagined that our legislators framed this Standing Order because they’d nothing else to do, it is quite certain that there must have been a *cause* for its introduction; and the only cause that can reasonably be imagined is, that, before its introduction, at some time or other, surveyors *allowed* for “curvature,” and thereby did that which they now know perfectly well *must not, cannot* be done. Suppose, now, we turn to *Joyce’s Scientific Dialogues*, which we have not yet put upon the shelf, and refer to the Conversation already quoted, for *the reason why* it is there stated that it is “necessary for those who are employed in cutting canals to make a “certain allowance for the convexity.” Here, then, we find the reason. The words run thus:—“Another proof of the globular figure of the “earth is, that it is necessary” and so forth,—*necessary* to do that which we have shown is *not* done, and *cannot* truly and legally be done! The assertion is made, then, as a “proof” that the earth is a globe! *The theory of the earth’s rotundity goes begging for a proof, and this is the very best that can be got!* REASONING MAN! what think ye of it?

What shall be said now? Say that right is wrong, for no one will believe you; say that black is white, for you will deceive nobody; say that two and two is not four, and you will take nobody in; say *anything* so long as it be *transparent* one way or other—in its truth or fallacy;—but, until the time when the snake in the grass shall have become the symbol of uprightness, and a wolf in sheep’s clothing, a true picture of honesty, say *not* that the Theoretical system of Astronomy which is taught in the nineteenth century is worthy to be adopted by the rising generation whilst those who have grown old and grey-headed in the advocacy of it know not how to prove it; say *not* that the Earth is a globe, until you *know* it to be one, for too many believe the delusion as it is; say *not* that a thing must be right because you have been *taught* to believe it, for most people seem to think so; and let it *not* be said that we are satisfied with error and delusion and inconsistency and untruthfulness, whilst the light of Reason shines around our footsteps, and whilst our motto is—“*Excelsior!*”

OPINIONS OF THE PRESS.

THE ENGLISH LEADER, AUGUST 13, 1864.

"Theoretical Astronomy. By Common Sense. Parts I & II. (Pitman.) Either this author has not common sense, or we have not; for the greater part of what he writes we do not understand, and the part we do understand we disbelieve. The work is dedicated to Parallax, a writer who must smile at the credulity of any one who takes his view upon any subject."

THE OBSERVER, JANUARY 15, 1865.

"Theoretical Astronomy, examined and exposed by Common Sense. (Job Caudwell, Strand.) The writer of these brochures undertakes to show that the earth is not round, even though ships may sail to the west by Cape Horn, and return by the east round the Cape of Good Hope, because no "round world" is spoken of in the Bible; because the standing order of the House of Commons has put a stop to the allowance of curvature in railway surveys; and for sundry other reasons of an equally weighty description."

THE CHURCH TIMES, FEBRUARY 11, 1865.

"Theoretical Astronomy Examined and Exposed. By "Common Sense." London: F. Pitman. THERE is hardly anything more offensive than the ignorance which affects superior wisdom and learning. To hear men who have never studied politics laying down political principles; men who have never given twenty consecutive minutes to the examination of theology and Church history, dogmatising upon the mysteries of the Faith; men who have never read a legal book through asserting their views of jurisprudence; men who have never studied any science attempting to teach the whole cycle of the sciences, is remarkably unpleasant, but it is one of the penalties we pay for the spread of "civil and religious liberty;" one of the fines imposed upon us by the progress of what is amusingly called "education." It was but the other day we heard an argument between a cultivated theologian and one who frankly admitted that a theological training had not formed a portion of his education. The former used arguments which were perfectly unanswerable, but that did not matter. He could not get hold of his adversary, who slipped away from him like an eel in the hands of an inexperienced fisher. Let him prove as much as he liked the truth of the sacramental system of the Church, the other had always a way of escape; and at one point of the conversation a dialogue something like this occurred:—"Thus, you see, from Scripture alone—the authority of which you admit—I have shown the fact of the Real Presence. The next thing is to show how the Real Presence affects the question of reverence." "Oh, yes, but wait awhile," quoth the other, "you haven't shown that there's anything about a chancel or a surplice mentioned in Scripture." We are bound to say that the gentleman in question tried his best to prove these things also; but when he had succeeded in showing the resemblance between the Sanctuary and the Holy of Holies, and between the ephod and the surplice, his opponent closed all argument by saying "Well, you have it all at your fingers' ends: but I expect there's some answer to what you say." What need, for further controversy, when one of the reasoners takes refuge in the supposition that no doubt there is some way of escape from an obvious conclusion? Now this is just what "Common Sense" is trying to do with Astronomy, and what Protestants endeavour to do with Theology. "A little knowledge is a dangerous thing"—but it carries its own shield in its self-complacency. Have men, whose lives have been devoted to the consideration of the subject, arrived at an unanimous conclusion upon it? Why should that affect John Smith? He has a right, or so he says, to believe just as much or as little as he pleases. He won't take the trouble to study the matter—he has something else to do, he will tell you. But he takes a section of the subject, reads a "popular" book about it, picks out a few things which are in perfect harmony when considered with others as a great whole, and because they appear to "the thing he calls his mind" to clash, he begins to ridicule the whole affair; and, if in conversation, with many emphatic thumps on the table; if in writing, with many italics and small and large capitals, he expresses his scorn for the entire business as utterly unworthy the attention of a man of "common sense." What a much abused term is that! They who habitually use it are usually the most profound asses, the most insane parrots, the most utter drivellers of the entire community. The odds are, that when a man avers his "common sense" revolts at something, that something is beyond question true. Sense is not perhaps, a very plentiful article at any time; but there is plenty of "common sense" and it would be well for the world if there were a good deal less of it.

We must leave the remainder of this gentlemanly review from the "Church Times" for the cover of our next number:—we say "gentlemanly," because, if it be not this, it ought to be; and we should be sorry to err on the uncharitable side. We hereby beg leave to return thanks to all our Reviewers, and to assure them that the most damaging arguments which it may be possible to produce in order to put us down shall be given to our readers that they may form their estimate of the value of them. Editors! do YOUR BEST: we don't know how WE can act more fairly to our readers.—C. S.

William Carpenter, Zetetic Printing Office, South Street, Greenwich.

THEORETICAL ASTRONOMY

EXAMINED AND EXPOSED:

By "COMMON SENSE."

MODERN ASTRONOMY THE OFFSPRING OF IMAGINATION.

"The earth on which we stand, and which has served for ages as the unshaken foundation of the firmest structures, either of art or nature, is divested by the astronomer of its attribute of fixity, and conceived by him as turning swiftly on its centre, and at the same time moving onwards through space with great rapidity. The sun and the moon . . . become enlarged in his imagination into vast globes. The planets . . . are to him spacious, elaborate, and habitable worlds. . . . And the stars themselves . . . are to him suns of various and transcendent glory—effulgent centres of life and light to myriads of unseen worlds."—SIR J. HERSCHEL.

CONTENTS.

Sir John Herschel takes the Copernican system "for granted" . . . A bold step: but proved to be a wrong one. . . "Iconoclast" and Mr. Woodman. . . Travelling "more than a hundred thousand miles" in a few minutes! . . . An Astronomical Joke. . . M. Arago, and his want of confidence in his own senses. . . "As the Old Cock crows, the Young Cock learns" . . . What the Athenæum says. . . The Tailor and his Coat. . . Sir John Herschel's "Thread" and "Pearls" . . . The First Step in the Wrong Road. . . An Earthly Body the Chief of the Heavenly Ones! Astronomical Arguments, Schemes, Tricks, and Conclusions. . . Nothing Proved or Demonstrated in Sir John Herschel's Volume. . . Sir John's Grammatical Contortions to make out a Case—"Exposed," of course. Mr. Glaisher once more. . . "Materially" and "Sensibly"—How much? . . . Sir John Herschel's Clever Paragraph (No. 22.) . . . "However" and "Wherever" synonymous in the Astronomical Vocabulary. . . Sir John's Grand Transformation Scene. . . Sir John's Diagrams elucidating the Text; and the Text, his Diagrams—(Nothing to do with Nature: she being Illustrated beautifully enough) . . . Sir John "Supposes" that his Diagrams represent Nature, and People "believe" that his Conclusions are True! . . . Sir John's Own Words to show that Astronomy is founded on Imagination! . . . Truth must out sometimes. . . A Word of Advice, &c.

LONDON:

JOB CAUDWELL, 335, STRAND, W.C.

OPINIONS OF THE PRESS.

THE MORNING ADVERTISER, JANUARY 21, 1865.

"Theoretical Astronomy Examined and Exposed. By 'COMMON SENSE.' Parts I., II., and III.—London: Job Caudwell, Strand. SINCERE conviction earnestly urged, and resulting not from hasty prejudice or unreasoning obstinacy, but from a peculiar and exceptional mental bias, is deserving of respect and consideration, not the contempt and ridicule which is too often its fate. We had all thought that the system of Copernicus, and the discoveries of Galileo, Tycho Brahe, and Newton, were received as matters no longer to be discussed, much less disputed. Here we have, however, no brainsick speculator or rapt stargazer, but a sane, sober, hard-thinking, reasoning, well-informed man, adducing arguments, aye, and plausible arguments too, to show that the world is a plane surface, and not a globe, as man and youth have been taught; that the sun goes round, or rather over and under, the earth; in short, that error and delusion have blinded the mental vision of the scientific men whom we have worshipped with unreasoning idolatry. Pope said—

"Nature and nature's laws lay hid in night—

God said, 'Let Newton be,' and all was light."

"The little Queen Anne's man" it seems was woefully misled, and the millions of Europe, Asia, Africa, and America, have been equally bamboozled. The writer, who has adopted the pseudonym "Common Sense," displays certainly uncommon ability in support of his thesis—or skill in riding his hobby, as it may be more properly termed. "Common Sense" proposes as his axiom of investigation Dr. Beattie's axiom, "When men are once satisfied to take things as they find them; when they believe Nature upon her bare declaration, without suspecting her of any design to impose upon them; when their utmost ambition is to be her servants and interpreters; then, and not until then, will philosophy prosper." Our author next appeals, certainly rather to our "senses" than to our "sense," as to whether the earth is round. He arrives at the conclusion of Byron's excellent "Commander of the Faithful," and lord of the unfaithful Gulbeyaz, who was—

"Sure the moon was round,

And also was convinced the earth was square,

For he had travelled sixty miles, and found

No sign that it was circular anywhere."

"Our author, however, is not to be classed with the ignorant—far from it. He has examined, weighed, and considered all the "proofs" of the astronomers, and, by his balance, "found them wanting." Whether he will find others to approve of his balance, or able to see through his spectacles, is another question. He puts his case ingeniously. One little point amused us, and though it does not convince us of the earth's flatness any more than of its actual concavity, suggests a reflection that may serve to humble a too arrogant assumption of facts admitted without enquiry.

"Another curious effect of the aerial ascent was, that the Earth, when we were "at our greatest altitude, positively appeared concave, looking like a huge dark bowl, "rather than the convex sphere such as we naturally expect to see it. . . The horizon "always appears to be on a level with our eye, and seems to rise as we rise, until at "length the elevation of the circular boundary of the sight becomes so marked that the "earth assumes the anomalous appearance, as we have said, of a concave, rather than "a convex body."—Mayhew's Great World of London.

"Mr. Elliott, an American aeronaut, in a letter giving an account of his ascension "from Baltimore, thus speaks of the appearance of the earth from a balloon:—"I don't "know that I ever hinted heretofore that the aeronaut may well be the most sceptical "man about the rotundity of the earth. Philosophy imposes the truth upon us; but "the view of the earth from the elevation of a balloon is that of an immense terrestrial "basin, the deeper part of which is that directly under one's feet. As we ascend, the "earth beneath us seems to recede—actually to sink away, while the horizon gradually "and gracefully lifts a diversified slope stretching away farther and farther to a line "that, at the highest elevation, seems to close with the sky. Thus, upon a clear day, "the aeronaut feels as if suspended at about an equal distance between the vast blue "oceanic concave above, and the equally expanded terrestrial basin below."

"The chief peculiarity of the view from a balloon, at a considerable elevation, "was the altitude of the horizon, which remained practically at a level with the eye at "an elevation of two miles, causing the surface of the earth to appear concave instead "of convex, and to recede during the rapid ascent, whilst the horizon and the balloon "seemed to be stationary."—London Journal, July 18, 1857."

"These extracts are followed by others from Burchett's LINEAR PERSPECTIVE, the LEISURE HOUR, &c. Indeed the writer appears to have ransacked every modern publication for passages to confute the received theory of our solar system, and indeed our Geodesy in bulk and in detail. Our author is never dull, and his onslaughts on what he believes to be error are hearty and trenchant. Without endorsing his arguments, or holding his peculiar theories, we can commend these little pamphlets to the reading and thoughtful public."

CHAPTER IV.

"We shall take for granted, from the outset, the Copernican system of the world." So says Sir John Herschel, at the commencement of his celebrated work called *Outlines of Astronomy*, or, in another form, *A Treatise on Astronomy*. And a bold stroke, too, is this *taking for granted*. The thing so taken may be right—it may be wrong. The doing of this thing may be wise—it may be otherwise. Sir John Herschel, however, having pledged his word, keeps to it. It would have looked better had he broken it. The case is one which *demand*s investigation; and taking "for granted" is not enough. The Rev. W. N. Molesworth, M.A., in his *Plain Lectures on Astronomy*, says: "Few controversies have stirred men's souls more deeply" than that, as to whether the earth is fixed, or whether, on the other hand, it has the various motions ascribed to it: rotation, revolution, and so forth. He says, also, "There was a time, and that not very remote, when the motion of the earth was as universally rejected as it is now universally believed—when its immovability was regarded not merely as an established fact of science, but as an article of religious faith." It is, however, quite certain that the belief in the Copernican theory is a long way from being "universal." John Bonnycastle, in his *Introduction to Astronomy*, says, when speaking of the earth, "This vast body was long considered as a large circular plane, spreading out on all sides to an infinite distance; and the heavens, above it, in which the sun, moon, and stars, appear to move daily from east to west, were imagined to be at no great distance from it, and to have been created solely for the use and ornament of our earth. Of this notion are the vulgar, and those who are ignorant of Astronomy, to this day. But," continues Mr. Bonnycastle, "it is now well known to mathematicians and philosophers, that the earth is of a round or spherical figure, nearly resembling that of a globe." So then we find that the belief in this "theory" is not with the "vulgar," even now; and only the "mathematicians and philosophers" are imagined to possess a *knowledge* of it. And now if we remember what Lord Brougham said, that probably "not a hundred now living have ever gone through the whole steps of these demonstrations," we shall have a better idea concerning the *universality* of the Copernican theory at the present day than we otherwise should. So that it admits of no question that people are not yet agreed respecting the subject, and that it may probably "stir men's souls" yet again. And what shall we say now that we find that one of the most renowned of the astronomers of the present day has absolutely taken the thing *for granted*—as a matter of course? Why, simply this, that what we—the people—are *supposed* to believe, is nothing more than what our teachers themselves have taken upon trust!

And what an old, old story is this. Throughout the whole world, we find the son taking for granted that *his* father is right: so that the Hindoo begets Hindoos; the Mahomedan, Mahomedans; the Mormon begets Mormons; and the Copernican, Copernicans. And what is the consequence? Error is perpetuated instead of being eradicated. Here is an illustration. The Rev. Woodville Woodman, a year or two ago, took part in a discussion with "Iconoclast," the subject being, *Is the Bible a Divine Revelation*. Mr. Woodman endeavoured to show that the Bible and Nature both contained "apparent truths" and "genuine facts," and that the "apparent truths" were the "reverse" of the "genuine facts." And why? Because he took it for granted that it was a *genuine fact* that the earth moves, and only an *apparent truth* that it does not; and, by a very easy shift, carried this train of ideas to the Bible itself. The reverend gentleman appears to forget that what is not true must be false; and that *that* which is merely an *apparent* truth and not a *real* truth, is no truth at all. Besides, is not that the very worst of all falsehoods which *appears* upon the face of it to be *true*? Mr. Woodman has positively told us, in a very polite way, that the Bible is one-half falsehoods of the worst description, whilst his avowed intention was to prove it to be a divine revelation! The fact is (whether the Bible contain false statements or not), Nature tells no lies; and if Mr. Woodman had not followed in Sir John Herschel's steps, and taken the Copernican system for granted, he would not have told us that she did. But, in the course of the second evening, the reverend gentleman made use of these words:—"We have travelled more than a hundred thousand miles since we entered this room." And the probability is, that the whole of the audience, "Iconoclast" and all,—took it for granted!

And now, whilst we are upon this stage of our proceedings, just one word for "Iconoclast," prompted as we are to say it by the consideration of our own position. We are doing that with regard to others, which we would not that others should be doing unto us: namely, exposing folly and error, or what may be worse than either. We should not feel at all comfortable, were the shafts of ridicule or well-deserved sarcasm directed towards us; and we do not intend, if we can help it, to give any just cause for such a course of procedure. Are we, then, carrying out the good old precept, "Do unto others as ye would others should do to you?" In one sense, No. But mark! "Iconoclast," in the course of the discussion already spoken of, gave forth a maxim which may well be placed side by side with the old one:—"Do that which is right, whether it is that which ye would that others should do unto you or not." Now then, in another sense, we reply, Yes: and for this reason:—We are doing that which we know is right, and we say to others—to the world—Do ye even so unto us.

It will, however, be said that, after all, we must take *some* things for granted. Yes: but what class of things? If a well tried friend give us a piece of information, we have a right to take the substance of it for granted, if it do not clash with some well known principle in connection with the subject. We have a right to take it for granted that, at certain times and in particular places, the sun may be seen revolving

in the heavens in its horizontal course, neither rising nor setting in the whole period of four-and-twenty hours, because the evidence concerning it is indisputable. We have a right to take it for granted that there is a place called Australia, because the thing is *unquestionably* true; no one denies that people have gone there, made fortunes there, and come back from there; and it is patent to all who may never have so much as seen the briny ocean. But is it so with the case in question? Is it *evident* that we are the inhabitants of a planet? Is it *clear* that we are spinning round, many hundreds of miles in an hour, besides rushing round the sun at the rate of more than a thousand miles a minute? Is it even *conceivable*—not to say *reasonable*—that there should exist people far down below us, with their heads away from our heads, and their feet pointing upwards towards our feet; and yet these very people teaching their children that *they* are on top, and *we* beneath? Why, if our children ask us about this matter, we are *compelled* to tell them that we don't *understand* it, but that it *is* so, because the astronomers tell us that it is! And the most intelligent man living would have no better reason to give than this.

And now let us see why Sir John Herschel has taken this "beautiful" Copernican theory for granted. We must return to his book. The volume before us is called *A Treatise on Astronomy*, by Sir John F. W. HERSCHEL, Bart. K.H., M.A., D.C.L., F.R.S. L. & E., M.R.I.A., F.R.A.S., F.G.S., M.C.U.P.S., &c. &c. The words of such a man as this we need not scruple to repeat. At page 4, then, we find them:—"We shall take for granted, from the outset, the Copernican system "of the world; relying on the easy, obvious, and natural explanation it "affords of all the phenomena as they come to be described," and so on. "Easy," "obvious," and "natural!" Never was a smarter joke than this perpetrated by man of title, power, or wealth. *Easy?* Why, the Copernican theory of astronomy, as we now have it, is *confessedly* about the most difficult theory ever invented by man to account for anything. Sir John Herschel himself, in the next page of the volume before us, after having given the "utmost pretension" of the book, goes further still into the subject, and says that, "at most," all the reader must expect, if he wish to enter the astronomical temple, is, to have laid before him "a ground plan of its accesses," and to be put in possession of "the pass-word." And we venture to assert that, in all probability, not one in a thousand who have begun Sir John Herschel's book has ever read through to the end of it. *Obvious*, too! The fact is, there is no possible chance for a thing to be obvious, when it is in opposition to all the evidence of the senses, or, contrary to observation. It is only saying that the thing is that which it is not: that is all. M. ARAGO says, in his *Lectures*, when speaking of a certain part of the student's course, "We have learned to distrust the evidence of our senses." If this is true, it is then easily understood how that the most outrageous things can be *called* obvious, or the most impossible things be imagined to be truths. And, above all, is the Copernican theory said to be *natural*! When it can be proved to be true, then let who *will* call it natural, but not till then. No. Just as we are even now proving it to be untrue, so do we prove it to be the opposite of what it is said to be.

We must try, however, once more, to give the whole of the sentence. "We shall take for granted, from the outset, the Copernican system of the world; relying on the easy, obvious, and natural explanation it affords of all the phenomena as they come to be described, to impress the student with a sense of its truth, without either the formality of demonstration or the superfluous tedium of eulogy, calling to mind that important remark of Bacon, '*The confirmation of theories relies on the compact adaptation of their parts, by which, like those of an arch or dome, they mutually sustain each other, and form a coherent whole*;' not failing, however, to point out to the reader, as occasion offers, the contrast which its superior simplicity offers to the complication of other hypotheses." How cruel it appears, at first sight, to dispel the illusion afforded by a dream so comfortable as this: where things jog along so simply and easily; where all is so obvious and natural; where we may take everything for granted; where eulogy is superfluous; where to make a theory square with nature is only to make it square with itself, and to leave nature out of the question altogether; and where demonstration is formality—a mere piece of supererogation! But the dreamer must not always be dreaming. At page 6, we are informed that "it is always of advantage to present any given body of knowledge to the mind in as great a variety of different lights as possible." Is it not obvious that, of all the lights in the pathway of science, the light of demonstration is the one most desired by the searcher after Truth? Compared with every other, it is as the light of the sun to that of a meteor. And yet Sir John Herschel is satisfied whilst he shuts it out. *The Copernican Theory of Astronomy has not been demonstrated*: and, to the minds of its votaries, it is as the dream to the dreamer, fascinating and intrinsically true, while in truth it is but a baseless fabric. What then, after all, is the reason that Sir John Herschel has taken it for granted? Until some better reason can be assigned, we must fall back upon that which is the most natural, and conclude that this is of all reasons the most probable. The elder Herschel, Sir William, was one of the most enthusiastic followers of the Copernican theory that the world has ever seen or ever will see; and, being a gifted musician, it is easily conceived how that the key-note of this enchanting theory having been once struck all else followed on easily and naturally; how that the younger Herschel, Sir John, enraptured with the melodious imagery of the spheres, lent his powerful and unremitting aid in the developement of those theories which have filled the world with amazement on account of their incomprehensibility: and how that in due time he who was leader gave place to him who is even now so eminently qualified to fulfil the duties and to receive the plaudits which necessarily arise in consequence of holding the distinguished position to which he has so naturally and so honourably attained. In fact, though we beat about the bush till doomsday, we shall find, after all, that the reason is to be found in the proverb, to the shrill voice of which every farm-yard testifies, that "As the old cock crows, the young cock learns."

But there is one consideration which must not be forgotten. Sir John Herschel has promised to point out, "as occasion offers," the "contrast" which the "superior simplicity" of the Copernican system

offers to the "complication of other hypotheses." It will be seen by the very terms of this statement that the Copernican system is acknowledged to be sheer hypothesis after all. But the point is this. The occasion does not offer itself in the volume before us: so that *neither the superior simplicity nor the contrast has been pointed out*. And how would the thing be possible? The complication of some of the old systems of astronomy is said to be owing to what are called *epicycles*. What says the *Athenæum* about this? In a *Review* in the number for January 3, 1863, concerning a volume entitled *The Earth and its Magnetism*, we may read as follows:—"Let Mr. Worms stand informed, not only that Copernicus used epicycles, but that the astronomers of our day use twenty where Ptolemy used one: but not under the old name, nor precisely in the same way." So much for simplicity!

We have now to look at the consequences which have arisen from the fact that the Copernican theory *has* been taken for granted. Just imagine a tailor making a coat, and having no measure save a questionable one which he takes for granted. The coat is finished, brought home, and put to the test: and it will not fit. 'Look,' says the tailor, 'what beautiful work has been put in it!' 'All to no purpose,' replies the customer, 'it won't fit.' 'But consider the trouble I have had to produce a compact adaptation of its parts!' 'Can't help it,' says the customer, 'it won't fit!' 'But, my dear sir,' continues the tailor, 'see how the parts mutually sustain each other, and form a coherent whole, as Bacon says is requisite!' 'Extremely sorry,' says the customer, 'but the fact is, Bacon or no Bacon, the thing won't fit, so there's an end to it.' This would be the case to a nicety with Sir John Herschel and his enormous bundle of elaborately worked Copernican theories, but for one circumstance: namely, whilst it cannot be denied that the tailor made his coat, at all events, a complete coat, it cannot be asserted that the Copernican system has the smallest claim in the world to be viewed in the same favorable light. Complete it is not. Stupendous in its conception, elaborate in its details, not only is it *out of all proportion to nature*, but it is, as we shall see by holding it up to the light and discovering its defects, in every respect unworthy to be adopted by us, or to serve, even as a misfit, the requirements of anybody else.

Sir John Herschel, however, promises to place under inspection a central thread of common sense, which is supposed to run through the whole affair. Now this is very important. As well might we expect a man to stand upright having no backbone, as a theory to be what it ought to be without common sense running through it in some form or other, even though it be no thicker than a thread. We must have the author's own words. At page 8, the author says that the "aim" of the book is to place under the student's inspection "that central thread of common sense on which the pearls of analytical research are invariably strung; but which, by the attention the latter claim for themselves, is often concealed from the eye of the gazer, and not always disposed in the straightest and most convenient form to follow by those who string them." There is a true picture here, requiring only a little shifting about to enable anyone to see it clearly enough. The "central thread of common sense" spoken of is, indeed, so difficult to be caught

sight of, and so crookedly disposed, that we are reminded of the silken gossamer in the summer's sunbeams; and Sir John Herschel attempting to show it forth bedecked with pearls, is like a child endeavouring to make the spider's web the groundwork of a necklace.

Having now attended Sir John Herschel throughout his introductory course, and become acquainted with his intentions, we stand as it were on tiptoe to see how next he will conduct himself: to see if he take the safe path of positive truth, or the treacherous ground of assumption. He who takes the first step in the wrong road had better be called back at once: it is easier far to point out error at the starting-point, than to attempt to do so in the heat of the journey. Sir John Herschel begins his first chapter. All his chapters are composed of paragraphs which are numbered, and which we shall call *sections*: chapter one beginning with section 11. In section 11, then, Sir John is just looking round; and he tells us what Astronomy is. We learn that "the assemblage of objects to which the attention of the astronomer is directed" is "sufficiently" indicated by "the term astronomy itself, which denotes 'the law or rule of the *astra*, by which the ancients understood not only 'the stars properly so called, but the sun, the moon, and all the visible 'constituents of the heavens.'" Very well. Now what is the first step Sir John Herschel takes? We see it in section 12. He says, "But, 'besides the stars and other celestial bodies, the earth itself, regarded 'as an individual body, is one principal object of the astronomer's consideration, and, indeed, the chief of all.'" Sir John then says, it is "the station from which we see all the rest," and, "the only one among 'them to which we can, in the first instance, refer for any determinate 'marks and measures by which to recognize their changes of situation, 'or with which to compare their distances." Behold the first step in the chapter of accidents! The study of the *heavenly* bodies constitutes astronomy, and yet, of these *heavenly* bodies, the *Earth* is, "*indeed, the 'chief of all!*" Why, we might just as well talk of a voyage being made to America, the *chief* object of which was that the passengers might stay at home. *The earth is NOT a heavenly body*: and Sir John Herschel has *no right* whatever to say that it is. Let any man ask himself the question whether, if an earthly body be a heavenly one, virtue may not be vice; the light, darkness; and he himself when wide awake, fast asleep and dreaming. But Sir John Herschel has crowned the Earth king of the heavens at once. It was a bold stroke, but there will come an end to it. "The station from which we see *all the rest*," says Sir John; and "*the only one among them* to which we can refer," and so on! Why, if we are treated with such assumption as this at the outset, and receive it meekly, what may we not expect by and by? *In theory*, the earth is here as completely indented with all the heavenly bodies, as though it were some particular orange shaken up amongst a sackful: when, *in fact*, nothing whatever in common between the earth and the heavenly bodies can be shown to exist!

The author now makes a just remark. In section 13, we read as follows:—"To the reader who now for the first time takes up a book on 'astronomy, it will no doubt seem strange to class the earth with the 'heavenly bodies, and to assume any community of nature among things

"apparently so different." This is unquestionably true; but, more than this, it is passing strange that Sir John Herschel should be blind to the fact that this idea is perfectly natural and justifiable, and that to assert a thing which will "no doubt" give rise to such an idea must be to assert something which stands so much the more in need of plain and unequivocal evidence that the thing itself be not false. But Sir John has either overlooked or disregarded this matter: for he tenders first of all a bold assumption, and then, as we shall see, calls that "prejudice" which, as a thoroughly natural and legitimate sentiment, questions the assumption. After Sir John, in the next place, has shown the entire absence of any similarity whatever, as far as all appearances go, between the earth and the heavenly bodies, he speaks thus of the instinctive tendency of the human mind to think it "strange" that they should be classed together. He says, "To get rid of this prejudice, therefore, is the first step towards acquiring a knowledge of what is really the case; and the student has made his first effort towards the acquisition of sound knowledge, when he has learnt to familiarize himself with the idea that the earth, after all, *may be* nothing but a great star." Now, the fact is, this is only treating us all as children; and saying as plainly as in so many words '*Open your mouth and shut your eyes*,' and all the rest of it. Why, you may do this sort of thing until the bitter shall be sweet, and the sweet shall be you don't know what. You may then *familiarize* yourself with any *idea* that may be given to you, and think it beautiful. But, that this is the way to *learn* anything, (unless it be how to deceive one another), we emphatically deny. And for Sir John Herschel to talk about acquiring "sound knowledge" in this way is not simply absurd but positively mischievous: his language not only being tolerated, but enforced, by the adventitious weight of his name. How would plain John Brown be scouted—and justly, too—if he dared to print such trash as this:—*That the first step in the path of science is to imagine that any well known thing may, after all, be but something else!* But SIR JOHN HERSCHEL says so: and this makes all the difference! With respect to the idea that the earth *may be* a great star, Sir John says, "How correct such an idea may be, and with what limitations and modifications it is to be admitted, we shall see presently."

In section 14, Sir John Herschel speaks of the importance of the question "whether the earth is in motion or at rest." He throws out a hint of the possibility of the earth being in motion "unperceived by us," and he says that the question is "one on which depends our only chance of arriving at true conclusions respecting the constitution of the universe." In the next section, then, (section 15), this *important* question is considered. Sir John reminds us that it is of the motion of the earth "*as a whole*," that he speaks: of "the ocean which flows around it, the air that rests upon it, and the clouds which float above it in the air." "Such a motion," he continues, "which should displace no terrestrial object from its relative place among others, interfere with no natural processes, and produce no sensations of shocks or jerks, might, it is very evident, subsist undetected by us." Pure astronomical reasoning, here! It is just as though we had presented to us something like this:—'*Such an author, who should, by suavity of*

'*language, by subtlety of speech, and by logical sophism, interfere with no prejudices, and shock no gentle soul, might, it is very evident, carry out his nefarious designs, mislead and enslave his readers, and subsist undetected by us.*' But, this no more proves that this supposititious author was anything that he ought not to be, than does the assertion that a motion, which *should* do this, that, and the other, "*might subsist,*" prove such motion to be a *fact*. What does the assertion do, then? It does much. It serves to stamp certain *ideas* upon the mind, and to aid in the taking place of a mere "conception" in the mental womb of the reader, which *conception* is all that Sir John Herschel *pretends* to give us, though we look anxiously forward for the birth of a demonstration be it never so ugly. For, mark well this fact. After two pages have been taken up with argumentative matter, and two sections more have been brought to a close, Sir John says (section 18), "In order, however, to conceive the earth as in motion, we must form to ourselves a conception of its shape and size." The fact is, Sir John sees clearly enough that his arguments are valueless—not to say that he sees them to be *absurd*, as anyone else may if he pleases to look—and so he *draws no conclusion whatever from them*, but treats them as though they never existed, and drives off to something else! And what is the next thing? Why, forsooth, we have to "form to ourselves a conception" of some other thing in order that we may *conceive* this—the one over which two pages have been vainly spent.

We must continue, then, to follow the author whithersoever he leads us. In section 18, we read as follows:—"Now, an object cannot have shape and size, unless it is *limited* on all sides by some definite outline, so as to admit of our imagining it, at least, disconnected from other bodies, and existing insulated in space." This is utterly erroneous, Sir John; and we will satisfy you that it is so. You know, perfectly well, the great difference between the *definite* and the *indefinite* article, in grammar. Now, when you say "*an* object," you speak *indefinitely*; hence, your proposition is true. But you cannot include *the earth* in your indefinite category of objects, as though it were a mere gewgaw—a child's battle-door or top. The earth is *sui generis*—a thing standing alone; there is naught else to be classed with it; and it can, therefore, only be spoken of as *earth*, or *the earth*, inasmuch as it is altogether beyond the pale of generalization. Hence, then, your proposition, as it relates to THE EARTH, is *not* true. The earth is *not* necessarily *limited* "so as to admit of our imagining it," or "insulated in space" so that we may gaze at it as though it were a soap-bubble. O, no, Sir John. Thus, then, is the course of argument in section 18 ruthlessly, and, you must admit, justly, destroyed. Say, rather, that man's knowledge is "limited on all sides," and you will be giving utterance to that which is indisputable. Still we follow you, Sir John.

Our author next says, "The first rude notion we form of the earth is that of a flat surface, of indefinite extent in all directions from the spot where we stand, *above* which are the *air* and *sky*; below, to an indefinite profundity, solid matter." He then continues,—"*This is a prejudice to be got rid of, like that of the earth's immobility;*" and so on. But why does not Sir John prove these *prejudices* to be errors?

If he do this, they would soon fall, never to rise again. But the thing is impossible. Do we speak of *proving* something? Why, the word *proof* does not exist in the *Contents* of the volume before us; and, as for the body of the work, consisting of 418 pages, it is somewhat hazardous to assert that the word does not occur even *once*: but certain it is that we know not where to find a single passage where anything whatever—concerning either the shape or the “motion” of the earth, or even the smallest matter in connection with the whole subject—is *said* to be demonstrated, or proved, or settled. In the *Introduction*, indeed, we read as follows. The author, when speaking in general terms of the science of astronomy, says, “Almost all its conclusions stand in open “and striking contradiction with those of superficial and vulgar observ-
“ation, and with what appears to every one, until he has understood
“and weighed the proofs to the contrary, the most positive evidence of
“his senses.” But, in the face of thus having been led to suppose that
“the proofs” are realities which may be *understood* and *weighed*, we find them not. The fact is, it is, as we have seen, the astronomers of the least note that make the greatest noise about “proofs;” whilst such men as Sir John Herschel, being, as may be supposed, somewhat wiser than their “followers,” say very little, if anything, about them.

But is there nothing which bears even a distant resemblance to the shadow of a proof that these *prejudices* are erroneous? O, yes. We find, in section 18, a “conclusion:” which, as it is based upon false *premises*, cannot, therefore, be expected to be *true*. The author speaks of the sun *rising* and *setting*: and he says that, since it does not travel “*through*” the earth, it “*must*,” therefore, go “*under*” it. Not a word said about the sun going its round *over* the earth—not one! And yet this is the view that has been taken of the matter by the earth’s inhabitants in every age. It is not true, then, whilst there remains even a *possible* mode which is omitted in the consideration of modes, that, of *two* which *are* mentioned, if one is not right the other “*must*” be. There is clearly no “*must*” in connection with any such circumstances as these. But Sir John Herschel says, “The conclusion is plain: the earth cannot “extend indefinitely in depth downwards, nor indefinitely in surface
“laterally; it must have not only bounds in a horizontal direction, but
“also an *under side* round which the sun, moon, and stars can pass:”—a conclusion which is false by reason of the omission already referred to. It must not, however, be considered that Sir John himself has the faintest notion in the world that this *conclusion* is a *proof*. O, no: we should hear of it, if he had. Instead of this being the case, he ignores his *conclusion*, and treats it—perhaps, the creation of his own brain—with that silent contempt which it so well deserves. For, in the next place, we come to section 19, which consists of two sentences, the first of which is as follows:—“As soon as we have familiarized ourselves with
“the conception of an earth without *foundations* or fixed supports—
“existing insulated in space from contact of every thing external, it
“becomes easy to imagine it in motion—or, rather, difficult to imagine
“it otherwise; for since there is nothing to *retain* it in one place, should
“any causes of motion exist, or any *forces* act upon it, it must obey
“their impulse.” Here, then, it is plain that we have received all that

we need expect in order to solve that question on the solution of which Sir John says *depends our only chance of arriving at true conclusions respecting the constitution of the universe!* We have been aided in the formation of a *conception*; and, with it having “familiarized ourselves,” we are told that it “*becomes easy to imagine*” that scientific conclusion which, if you please, Sir John Herschel wishes us to arrive at! Look, too, at the language:—“the conception of *an* earth!” If it be not the *deception* of an earth, we know not what deception is. We must bear in mind, now, that Sir John Herschel has made no advance, as yet, towards the settlement of the question of *the* earth’s motion, although, heaven knows, there have been more schemes than enough made use of in the attempt. But, look again at the language: for who can be blind to the nature of it? We dare to say that, in the whole domain of the scientific literature extant in the English tongue, a more flagrantly erroneous and reprehensibly delusive sentence is not to be found. We read, concerning that which we are to *understand* as *the* earth—albeit *the* earth is not spoken of at all—“since there is nothing to retain it in ‘one place!’” *SINCE there IS nothing!* O, the power of a little word! O, the power—the weakness—of a falsehood! Not that *this* is one. No. *This* is about “*an*” earth, not *the* earth,—some *imaginary* earth, of which you may form any *conception* you please, and not *the* earth on which we live and move. Mark, now, Sir John Herschel: all that you could or would say about the motion of *the* earth, is, that, ‘IF *there* BE *nothing* to retain it in *one place*,’ then, “should any causes of motion exist, or “any forces act upon it, it must obey their impulse.” And, then, who would dare to oppose a thing so self-evident as this?

But, the enunciation of *truth* will never aid the *Theoretical Astronomy* of the nineteenth century, unless, indeed, it be in its destruction. And, it is plain enough, that *error* does not serve this lame cause much better. For we find that the wind-up of section 19 is as follows:—“Let us next “see what obvious circumstances there are to help us to a knowledge of “the *shape* of the earth.” By all means. We even venture to think that *we* can possibly *help* a little in this matter. In the first place, we cannot err with regard to the object—*the* earth. We must keep in view, however, the fact that, to the present moment, nothing whatever has been given to us, by the author, in any wise worthy to be called *knowledge* respecting its shape. All this is yet to come.

We now arrive at section 20, of the volume before us, which begins thus:—“Let us first examine what we can actually *see* of its shape. “Now, it is not on land (unless, indeed, on uncommonly level and extensive plains) that we can see any thing of the *general* figure of the “earth;—the hills, trees, and other objects which roughen its surface, “and break and elevate the line of the horizon, though obviously bearing “a most minute proportion to the *whole* earth, are yet too considerable, “with respect to ourselves and to that small portion of it which we can “see at a single view, to allow of our forming any judgment of the form “of the whole, from that of a part so disfigured. But with the surface “of the sea, or any vastly extended level plain, the case is otherwise.” Suppose, now, we stay for a moment, and see that we thoroughly understand as far as this. We will leave the *negative* part of the business to

take care of itself, whilst we attend to the *positive* affirmation here given. It just amounts to this:—On “*uncommonly level and extensive plains*,” on “*the surface of the sea*,” or, again, on “*any vastly extended level plain*,” we can see something of “the *general figure of the earth*.” So far, ’t is good, and well said. Here is the same result obtained from the surface of the sea as from any vastly extended level plain—the *sea* and the *plain* in the same category—the plain, *level*, and the sea, *level*, too. This is knowledge, indeed. We may twist and turn this about in any way, and it will not affect it. It is in perfect harmony with all we really know in natural science. So grateful is this oasis in the theoretical desert that we fain would halt, and ruminate for aye. But is the appearance of the surface which is now presented to us indicative of the *general figure of the earth*? Yes, indeed: on the authority of Sir John Herschel! And here we venture to assert, once for all, that, if the writings of this gentleman be known in the future when men shall have ceased to be deluded by vain theories about the earth moving through space at a thousand miles a minute, so cleverly are they written that not only do they serve their purpose *now* but they will serve even *then* to be quoted in evidence that their celebrated author believed in his inmost soul that the earth was *motionless* and *flat*. But we must go on, and see how Sir John gives his gentle and simple readers proofs—no, not *proofs*, “conceptions”—that the earth—the earth—is round, like a ball or an orange. “If we sail out of sight of land,” continues Sir John, “whether we stand on the deck of the ship or climb the mast, we see the surface of the sea—not losing itself in distance and mist, but terminated by a sharp, clear, well defined line, or *offing* as it is called, which runs all round us in a circle, having our station for its centre. That this line is really a circle, we conclude, first, from the perfect similarity of all its parts; and, secondly, from the fact of all its parts appearing at the same distance from us, and that, evidently a moderate one; and, thirdly, from this, that its apparent *diameter*, measured with an instrument called the *dip sector*, is the same (except under some singular atmospheric circumstances, which produce a temporary distortion of the outline), in whatever direction the measure is taken,—properties which belong only to the circle among geometrical figures.” And now, in order to make a long matter a short one, and to avoid all mystification from *diameters*, *dip sectors*, *temporary distortions*, and *geometrical figures*, what is the plain, unsophisticated fact? Simply this: that, if there is nothing to obstruct our vision, we can see for the same distance all round us. And, surely, no one can doubt it. Sir John concludes section 20 with the following remark:—“If we ascend a high eminence on a plain (for instance, one of the Egyptian pyramids), the same holds good.” And here it will be just as well to fortify the mind by remembering a fact which has been known to the world ever since people climbed hill tops, but which, for some unaccountable reason, has been ignored by Sir John Herschel: namely, that, go where we will, the horizon always appears on a level with the eye. And we may also bear in mind that Mr. Glaisher says, when speaking of his balloon ascents, in the *Leisure Hour*, No. 563, “the horizon always appeared on a level with the car.” And, says the same gentleman, in the same

"Nature and nat-
God said, 'Let
the little Queen Anne's man' i
Europe, Asia, Africa, and America,
admitted the pseudonym "Coul-
support of his thesis—in skill in r
Common Sense" comprises as his a
are most satisfied to take things
have deduced, without susp
their utmost ambition is to be her s
philosophy progress. Our atti-
to our sense, as to whether
her excellent "Commander of

Quintus, however, is not
annoyed, weighed, and considered
"Sound them wanting."
able to see through his spectacle
the little point missed us, and th
more than of its actual concavi
or arrogant assumption of facts a
And that curious effect of t
at our greatest altitude, positiv
rather than the convex sphere su
always appears to be on a level
length the elevation of the circ
each assumes the anomalous a
power holds

[illegible]

the illustration is
 gh he deliberately
 y, so, if not more:
 somebody else—the
 poor “devil” of a
 ought to know it.
 lines (the radii)
 and which are to
 on each side, is
 which is called a
 not a degree, but
 ach this diameter
 d that is enough.
 arth” is “*sensibly*
 or how little it
 fact is, Sir John
 now no better—
 ht, the spectator
 ontally over to—
 a globular form,
 f and becoming
 in fact, that he
 elling the right

before us where
 of satisfaction
 and remarkably
 appearances, be
 of the earth,
 portions of the
 ely, that, as we
 ch bounds our
 l's own words:
 y, in any part
 ure of a body
 other than a

le of Newton
 ce where Sir
 : the precise
 he spot where
 enthusiastic
 n be no other
 not seen it.
 have to make
 eal, we must
 ich, however
 ere or globe.”
 ything. But,
 the last thing

periodical, for May 21, 1864, "the line of the horizon" *rises up* "to the height of the eye of the observer, how high soever he may be." A fact of more importance than this is seldom met with in print: and to have it uppermost in the mind just *now*, will be to have the right thing in the right place.

And now, at the risk of being tedious, we must quote section 21 just as we find it. "(21.) Masts of ships, however, and the edifices "erected by man, are trifling eminences compared to what nature itself "affords; *Ætna*, *Teneriffe*, *Mowna Roa*, are eminences from which no "contemptible *aliquot* part of the whole earth's surface can be seen; but "from these again—in those few and rare occasions when the transparency of the air will permit, the real boundary of the horizon, the "true sea-line, to be seen—the very same appearances are witnessed, "but with this remarkable addition, viz. that the angular diameter of "the visible area, as measured by the dip sector, is materially *less* than "at a lower level; or, in other words, that the *apparent size* of the earth "has sensibly diminished as we have receded from its surface, while yet "the *absolute quantity* of it seen at once has been increased." From the matter of this section, then, we find that "the very same appearances "are witnessed." And we must not, in a crowd of words, lose sight of what these "appearances" *are*. We must remember that they may be very briefly summed up: namely, that, ascend as high as we please—as high as we can—we shall see for the same distance all round us, unless prevented by some accidental circumstance. Again: we have seen that, according to Sir John Herschel, "the angular diameter of the "visible area is materially less than at a lower level." Now, if Mr. Glaisher is right, Sir John Herschel is wrong: and all the evidence we can glean from aeronauts shows that what Mr. Glaisher says is true, and that there is no genuine appearance of the *dipping* of the horizon below its level with the eye of the spectator even to the smallest imaginable extent. According to this, then, the angular diameter of which Sir John speaks is purely imaginary; and any diameter whatever must be a *simple* diameter, and, therefore, cannot be an *angular* one. In fact, a diameter, the centre of which shall be at the spot where the eye of the spectator is situated, and the ends of which shall touch the horizon on either hand, *must be a straight line*. But Sir John evidently wishes to make it appear that this line—this diameter—bends downwards on each side of the spectator: and so he calls it, *now*, the "angular diameter." What angle is formed, then, by the two drooping radii which we will imagine to exist just to please Sir John Herschel? It would be very important to know. And, moreover, *how much* "less" is this angle to be said to be when viewed from the summit of *Ætna* or of *Teneriffe*? We have seen what Sir John says: does this satisfy us? Decidedly, No! He says, it is "*materially less*." Who but himself can know what *this* means? If the two parts of the diameter of the visible area—the radii—droop downwards a single hair's-breadth each, the diameter would *then* be an *angular* diameter just so much less than 180 degrees in extent; and *this* would be "*materially*" less. How much does he mean, then? Sir John Herschel is satisfied in telling us that which cannot be understood, whilst, at the same time, he gives us a wood-cut,

on the opposite page, which cannot be mistaken. If the illustration is false, then, is not Sir John as much to blame as though he deliberately misinformed us in so many words? Unquestionably, so, if not more: for, whilst you cannot *charge him* with it, you may somebody else—the artist, the engraver, or even (in one's ignorance), the poor "*devil*" of a printer. The engraving is utterly false, and Sir John ought to know it. In this engraving, the depression of each of the two lines (the radii) which go to make up the so-called *angular diameter*, and which are to be supposed to be stretching downwards to the horizon on each side, is 40 degrees—not a *second*, (the ten-thousandth part of which is called a *material* amount by astronomers,)—not a *minute*,—not a *degree*, but *forty degrees*! But our author will not *say* by how much this diameter is supposed to be diminished: it is "*materially less*," and that is enough. And, again: we read that the "apparent size of the earth" is "*sensibly* "diminished." Pray, how much is *this*? How much or how little it is to be imagined to be, we are not informed. The fact is, Sir John clearly wishes us to believe—and people *do*, if they know no better—that, when the earth is seen from some very great height, the spectator has to look downwards at the horizon, instead of *horizontally* over towards it; that the earth appears, to the senses, to be of a globular form, and that it may be seen to be gradually rounding off and becoming diminutive as we rise above the level of the sea; and, in fact, that he himself—Sir John Herschel—has all along been travelling the right road instead of the wrong one.

And now we have arrived at a portion of the volume before us where it seems as though the author contemplated with an air of satisfaction the ground already gone over. Section 22 is short, and remarkably clever. Again these "appearances" are mentioned: appearances, be it remembered, all relating to the most nearly level parts of the earth, or to the sea itself which is correctly classed with such portions of the earth, and resolving themselves into one fact alone: namely, that, as we can see to a regular distance all round us, the line which bounds our vision must form a circle. And now for Sir John Herschel's own words:—" (22.) The same appearances are observed universally, in any part "of the earth's surface visited by man. Now, the figure of a body "which, however seen, appears always *circular*, can be no other than a "sphere or globe."

"There! there, now!" exclaims some enthusiastic disciple of Newton and Copernicus, "I *thought* we should soon get to the place where Sir John Herschel says that the earth is a globe!" Faith! yes: the precise spot where, if ever it should be said, it *ought* to be said—the spot where it *appears* as though it *were* said. "What!" says our enthusiastic friend, "is it not said plainly enough that the earth '*can be no other 'than a sphere or globe!*'" Look again, friend: we have not seen it. It *appears* to us to read very differently: but, as we now have to make such curious distinctions between the apparent and the real, we must look again. "The figure of a *body*," says Sir John, "which, however "seen, appears always *circular*, can be no other than a sphere or globe." This is *indefinite* language, and may have reference to anything. But, as to the idea that it can have reference to the earth, it is the last thing

to be dreamed of; and, although it *appears*—in consequence of the close relationship which it is made to sustain with the preceding sentence which treats of the earth's surface—as though it *really does* state that the earth is a sphere or globe, it says nothing of the sort. Sir John, having his wits about him, knows well enough that nothing which he has said about the surface of the earth will justify such a conclusion as this! O, no: he does not say that anyone should even *imagine* such a thing. He speaks of "*a body which, HOWEVER SEEN, appears always circular*:" but this can only be said of a thing that may be seen from any position; whereas we can see the earth but from the *top*. Truly, Sir John says that the *circular* appearance is manifest "in every part of the earth's surface visited by man:" but this is only as though the author had said WHEREVER the earth is seen, and not, by any means, "*however*" seen; and, surely, the *philosophers* ought to know the difference between "*HOWEVER*" and WHEREVER! Who can imagine for a moment, then, that Sir John Herschel is ignorant of this? *However* means—in whatsoever manner. Take a ball into your hand, and look at it from *above*, from *below*, and also from *beside it*: and then you may at once philosophize with Sir John Herschel, and imagine that you have turned the earth into a globe, whilst you exclaim, in the words of this renowned author, "Now, the figure of a body which, *however* seen, appears always "circular, can be no other than a sphere or globe."

Sir John Herschel, then, does not say that the earth is a sphere or globe; but he knows, or ought to know, that his arguments are so laid down, and his words so curiously managed, that his readers understand them to mean, distinctly, this very thing. If Sir John wishes the people to understand this, he should be bold enough to say so, and then be clever enough to prove it: but he has proved himself to be neither bold nor clever, except in managing matters so that his readers shall imagine that he says a thing and proves it, whilst, in reality, he does it not. Again: the seeker after Truth has but to notice the manner in which Sir John brings in the word "*circular*," to experience a sensation of disgust in connection with the whole affair. "*Circular!*" And why *circular*? Because the *horizontal* line which bounds the spectator's vision as he looks over the surface of the earth, let him be situated where he may, is in the form of a *circle*! Is not this a *horizontal* circle, and its area a *plane*? Does not Mr. Glaisher, in the account of his ninth balloon ascent, speak, shrewdly enough, of "the visible plain beneath," when at a height of "three and four miles?" Does he not in the *Leisure Hour*, No. 647, speak in such a manner as, positively, to attach the downright falsehood to the Copernican theory, by speaking of "the plane of the "earth"—*plane*, that is, *not* spherical? Does he ever speak of a *spherical* appearance being presented? or does he ever call the earth a *globe*? Does not he say—and does not his testimony accord with that of all other aeronauts—that the surface of the earth *appears* CONCAVE, just as it ought to appear if it were flat or horizontal? and is not this the very *opposite* of a thing *spherical*? And yet we find that Sir John Herschel suddenly and gratuitously transforms the true horizontal plane circle into a *spherical* one; and a globe springs into existence based upon this shameless and outrageous perversion; and, forsooth, this globe is sup-

posed to be the earth, and Sir John Herschel is *supposed* to say so.

Unfortunately, it is of no use to point out error as far as our author is concerned. The book has been written; the whole journey has been gone through; the chapter of accidents is completed. All that we can do is to show that the book is useless; the journey, fruitless; and the chapter of misfortunes and mistakes, a salutary warning to others. In section 23, then, we find the first illustration introduced to the reader's notice. The section begins thus:—“(23.) A diagram will elucidate “this. Suppose the earth to be represented by the sphere L H N Q, “whose centre is C,” and so on. Here, then, indeed, Sir John's words are elucidated: light breaks in upon them at once—only, however, to make the darkness more visible. The diagram illustrates the text; and the text, the diagram. And in this manner does Sir John make up what is to be understood as the “coherent whole” which he has told us is necessary to be formed. “Suppose,” then, “the earth to be “represented by the sphere L H N Q:” what then? Why, it is clearly a piece of supposition—a thing which has no bounds. The question is, *Does* the sphere represent the earth? Decidedly not. There is no necessity to *suppose* that the figure of a horse represents a horse, or that the figure of a spade represents a spade: in either case, the figure represents the actuality—it is a re-presentation, to the mind, of the thing itself. Ay, and so well understood is this, that, in common speech, it is not deemed necessary to speak of a picture being even a representation: for we see a picture of a horse, and we immediately call it a horse; or that of a spade, and we call it a spade. But when the diagram bears no resemblance to the thing intended—as when a child makes his first attempt to imitate some natural object, or when the astronomer draws a spherical figure to stand for the earth—the case is different: and it becomes necessary to *suppose* that the scratches or the figures represent the things intended, just as Sir John Herschel has done with his first illustration. Here, then, we find a circle, nearly two inches in diameter, which is *supposed* to represent the earth. On the top, at the distance of about a third of an inch above the circle, is the letter M, which is to be *supposed* to be the elevated position occupied by an observer. From this point, M, are drawn the two lines of which we have spoken, each one being at an angle of 40 degrees from the horizontal position, so as to touch the circle, and to form tangents to it, at points marked N and Q, each being nearly an inch from the point M. As, then, these two lines—which are *supposed* to represent (in Sir John's own words) “the “visual ray along which the spectator at M will see the visible horizon,”—may be *supposed* to be made to sweep round the top of this circle, the result would be, that a portion which Sir John calls a “spherical “segment or slice” would be cut off, the area of which would be *supposed* to represent that portion of the earth visible to the spectator at M. What says Sir John? His words are these: and mark well the fact that he has (so far as the reader may judge) altogether *forgotten* the real nature of his argument, and has left all “supposition” out of the question. He says, “The area of this circle is the portion of the earth's “surface visible to a spectator at M, and the angle N M Q included “between the two extreme visual rays is the measure of its apparent

"angular diameter." O, no, Sir John: it is not so. You may get the people to believe it; but you could *never* prove it. A teacher of natural history would find many a child who, in his simplicity, would *believe* that a giraffe was a great horse: but, when the child grew to years of discretion, the probability is that he would believe his teacher to have been a great donkey. O, no, Sir John: it is getting too late in the day for this. The spherical "slice" which you give us is *not at all like* the area seen by man from an eminence; the angle NMQ is *not at all like* the measure of its diameter—and we promise to prove to you, by and by, that, according to your own showing, it is *seventy-six degrees* wide of the mark; the diagram you give us bears no more resemblance to nature than the first scratchings of the child bear to the magnificent form of the horse, and can no more be said to represent it than does the "mark" of him who cannot write represent his name—representing as it does as well Jones as Brown, and Robinson as well as either, but that it is *supposed* in different cases to represent one or another; and the whole thing is so egregiously out of all character with anything we know to be true, that it is most difficult for us to keep down the idea that, if you pleased, you could tell us all that we are telling you, and a great deal more.

And where, now, is the "central thread of common sense" that was to be placed under our inspection? Where are the "pearls of analytical "research" that were to be held up to our enchanted gaze? Alas! we have even now had sufficient cause to banish all such pleasing anticipations from the mind; and we need look for little else to afford us any gratification, save that which may be found, in the *Introduction* to the work, along with the "proofs." Sir John Herschel says—and here, *for once*, in giving *his* words, we take the liberty to emphasize them as *we* please—"The earth on which we stand, and which has served for ages "as the unshaken foundation of the firmest structures, either of art or "nature, IS DIVESTED BY THE ASTRONOMER of its attribute "of fixity, and CONCEIVED BY HIM as turning swiftly on its "centre, and at the same time moving onwards through space with "great rapidity. The sun and the moon . . . become enlarged IN HIS "IMAGINATION into vast globes. . . . The planets . . . are TO "HIM spacious, elaborate, and habitable worlds. . . . The stars . . . "are TO HIM suns of various and transcendent glory—effulgent centres of life and light to myriads of unseen worlds: so that when, after "dilating his thoughts to comprehend the grandeur of those IDEAS "HIS CALCULATIONS have called up, and exhausting his imagination and the powers of his language to devise similes and metaphors "illustrative of the immensity of the scale on which HIS UNIVERSE "is constructed, he shrinks back to his native sphere; he finds it, in "comparison, a mere point; so lost . . . as to be invisible and unsuspected "from some of its principal and remoter members." There seems to be a time when a certain measure of Truth must out: and we have this measure—be it small or great—spread before us. Whilst, then, the astronomers have promulgated a system the main stay of which is IMAGINATION, may we seek a nobler and a better and a more harmonious system which shall be founded on the rock of TRUTH.

FROM THE MORNING ADVERTISER, JANUARY 28, 1865.

"PAST AND PRESENT ASTRONOMICAL THEORIES."

"TO THE EDITOR OF THE MORNING ADVERTISER."

"SIR,—Having the cause of truth sincerely at heart, permit me, whilst thanking you for your manful and unprejudiced review of the first three parts of a little work on astronomy in your impression for Saturday last, to point out a misapprehension which has arisen, and which is very likely to arise in the minds of many persons who have been schooled in the current astronomical philosophy. In the review, when the convictions of the author are spoken of, one is said to be that "the sun goes round, or rather over and under the earth." This is not the case. The conclusion arrived at by "common sense" is, that, although the sun appears to the superficial observer to travel over and under the earth, in reality, the circle described by it in its daily course round the heavens is a horizontal and not a vertical one; and, therefore, whilst it certainly goes round, it can only be said to go over, and not under, the earth. However, the main point is put clearly enough, that the author endeavours to prove, amongst other things, that the sun goes round the earth, and not the earth round the sun.

"And now, Sir, I beg leave respectfully to request that you will award honour to him whose due it is. For upwards of twenty years past, "PARALLAX" has been lecturing throughout almost the length and breadth of Great Britain upon the subject of astronomy; and your Correspondent is but one amongst a continually increasing number of converts to a sense of the importance of certain facts which have been hitherto ignored by scientific men. These facts constitute not mere circumstantial evidence, but they lead irresistibly and at once to a firm conclusion, that the Newtonian theory of astronomy is a delusion and a snare; and that Newton's celebrated words when on his death-bed were true in a more literal sense than is generally admitted, and that he was really "as a child playing with the pebbles upon the sea-shore, whilst the vast ocean of truth lay unexplored before him."

"Parallax teaches that the earth is an extended plane, "standing in the water and out of the water," as St. Peter of old says in his second epistle; that it is truly immovable, as our forefathers believed; that the sun, moon, planets, and stars run their periodical courses round this fixed earth, as we see them day by day; and that the fact of their appearing to rise and set, as though they arose from and went under the earth, is a necessary consequence of the laws of perspective appertaining to bodies moving over a level surface—just as in the case of a balloon travelling over one's head, it will appear to ascend until it arrive over the spectator, and descend as it leaves him, though it may be travelling all the while over a level country and parallel with it.

"Parallax," then, teaches that the centre of this fixed earth is that spot on its surface to which the compass (carry it where we will) always points: that this spot, called in modern times the North Pole, is simply the north point, and that the south is on every hand opposite the north, as the points on the circumference of a circle are on every hand opposite the centre; that east and west are relative and not absolute terms as the north and south are, and simply those opposite directions which lie at right angles to the needle as it points north and south; so that to travel easterly or westerly is to travel in a horizontal circle, and thus to arrive again at the starting-point if the circle be completed; and, again, we are taught that the surface of water is horizontal, and not (as the Newtonian philosophers tell us) convex; and that this is the result of natural laws which are not violated in the case of ponds or lakes, seas or oceans.

"But the teachings of "Parallax" do not end in the consideration of material phenomena. We learn that, literally, over and above this world of matter, there exists the world of spirit, or Heaven, in the Biblical sense of the word; and that it is not merely that problematical sphere somewhere beyond the confines of the stars (as our philosophers and divines tell us) "millions of millions of millions" of miles distant from us in one direction at twelve o'clock at noon, and as many millions of miles distant from us in an opposite direction at twelve o'clock at night! No, Sir; and it is well to observe that this brings the Scriptures right on this point also. And so far is this from being unimportant, that it scarcely admits of doubt that nothing in the whole realm of so-called philosophy has done more to cause man to reject the Bible, in his heart, than such teachings as these.

"And now, Sir, in concluding, it may be remarked that important considerations are suggested by the fact that the "Zetetic" philosophy is founded on a basis the nature of which is diametrically opposite to that upon which the Newtonian theories have been imposed. If, for instance, we take Sir John Herschel's exposition of these theories, namely, his elaborate "Treatise on Astronomy," we shall find these words, which, indeed, may be taken as the key-note of the whole composition:—"We shall take for granted, from the outset, the Copernican system of the world." The Zetetic philosophy admits of no such procedure as this; and, whilst the Newtonian philosophy would have us imagine that nature breaks her own laws and exhibits to us an ocean like unto a "vast convex mirror," and that we are the inhabitants of a heavenly body—a planet—dashing along in its orbit through space at the rate of more than a thousand miles a minute, the Zetetic philosophy stands upon the sure foundation of absolute investigation, supported on every hand by the unanimity of the instinctive dictates of the whole human race, the lessons of experience, the force of truth, and the teachings of

"Greenwich, Jan. 27, 1865.

"COMMON SENSE."

CHAPTER V.

SIR RICHARD PHILLIPS, in his magnificent work entitled *A Million of Facts*, says this:—"Nothing can be more impertinent than the "assertion of modern writers, that the accuracy of astronomical predication arises from any modern theory. Theory may have suggested "some unexplored corner, and increased the tables; but astronomy is "strictly a science of observation, and far more indebted to the false "theory of astrology, than to the equally false and fanciful theory of "any modern." It may be that the words of such a profound thinker may strike home in some case where those of "Common Sense" fall short of their object. One word more, then, from Sir Richard Phillips: and sure we are *he* never said it idly or penned it carelessly. He says:—"The execrable superstitions of Newton . . . are defended even to the "sword's point, and woe to him who for another century shall oppose "them." Woe be to us, then, if this be the case. We will see what can be done, however, for some of these "execrable superstitions," which even now permeate society. We have yet to do with Sir John Herschel, —one of the most influential on the list of those who promulgate the "false and fanciful theories" and the "execrable superstitions" of Sir Isaac Newton and Galileo and Copernicus in connection with modern astronomical science; and we proceed, at once, with our examination of his celebrated *Treatise on Astronomy*. We have seen how that Sir John Herschel has given a diagram, in the 23rd paragraph or section of his work, which is "*supposed*"—and only supposed—to represent the earth. This figure is in the form of a circle, and is to convey to the mind the idea that the earth is round or spherical, like a ball or an orange, in order that, in the author's words, we may form a "conception" of its shape and size, which "conception" he says is necessary before we can "conceive the earth as in motion." So that we find, as we now stand, we are just waiting for proof (and we wish we may get it) of the earth's rotundity or mobility, or both. Sir John Herschel will supply us with this, if he be able, we may be quite sure. Alas! the *will* and the *way*, in this unfortunate matter, seem perfect strangers: and even Sir John himself, though he knows the *will*, does not appear to know the *way*. However, we shall see. To prove that the earth is a globe, Sir John is, of course, naturally anxious to show that the surface of the earth at a distance from us *goes downwards*, or that it *falls* or "*dips*," we being *supposed* to be always on the top—*one* of those "execrable superstitions" which mars the fair face of astronomy. Hence, in section 24, Sir John essays to give us information concerning what is called, in *astronomical phraseology*, the *dip of the horizon*. He again refers to his diagram: and surely the astronomers would be dumb if they had not their pretty pictures to show us, and their scientific A, B, C to bore us

with. Let us lend an ear to a little more of that which evidently pleases Sir John Herschel, even though it fail to instruct us. First, then, let us look at his diagram. It consists of a circle: and beware of the *magic* of a circle—that figure which binds as well the captive slave as the fondest heart. On this circle are three protuberant angular figures—one at the top, and two towards the bottom—which are “supposed” to represent elevated positions in relation to the earth’s surface. Our attention is, as a matter of course, invited to the one at the *top*, since the members of the astronomical fraternity know full well that, if they attempted to explain anything concerning matters at the *bottom*, the struggle would be far too great for them: so, whilst they tell us that there is no such thing as *up* and *down* in nature, and no such thing as *top* or *bottom*, they show us *both* in their diagrams, and speak of one and ignore the other. Through the middle of the topmost elevation, then, a line is drawn in a vertical direction from the top to the bottom of it. The top of the line is marked with a capital M, and the bottom is marked with an *italic* “*m* : ” so that this line, which connects the two points, is called the line “M *m*.” And now, in section 24, Sir John begins his explanation of the *dip of the horizon* as follows:—“M *m*, “which is perpendicular to the general surface of the sphere at *m*, is “also the direction in which a *plumb-line* would hang; for it is an “observed fact, that in all situations, in every part of the earth, the “direction of a plumb-line is exactly perpendicular to the surface of “still water; and, moreover, that it is exactly perpendicular to a line “or surface truly adjusted by a *spirit-level*.” Now, all this is intended to mean something or nothing; and is either sense or nonsense. Let us see. “M *m*,” says Sir John, “is perpendicular to the general surface of the sphere at *m*.” Is this true?—*Perpendicular to a sphere?* A plumb-line will hang in a direction perpendicular to still water or to any other level surface; because, hanging vertically, it forms an angle of 90 degrees with a surface which is horizontal; and a thing can be perpendicular to any other thing only when this condition subsists. Is there this perpendicular relationship, then, between the line “M *m*” and the top of the circle in the diagram? Certainly not: and anyone with no more than a smattering of *Euclid’s Elements* must know this. But this line is said to be perpendicular to the “*general surface* of the sphere.” What does this mean? Why, simply, that this line which really cannot be perpendicular to the surface of a sphere at all, or under any circumstances, is perpendicular to it altogether—anywhere—generally! But stay! We read, “the general surface of the sphere at *m*.” How is this? The *general surface* of the whole thing at *some particular spot*! This is just as though a man were to say to another, ‘Bequeath your money to the nation in general, only to me in particular.’ What does Sir John mean? Why, if the plumb-line, which is in all places *vertical*,—that is, *straight up and down*,—is *perpendicular* to the surface at “*m*,” this surface *must be level*. And now we can just see what Sir John means when he speaks about the “surface of still water,” and the “line or surface truly adjusted by a spirit-level.” He means to say that the line “M *m*” is perpendicular to the surface of a sphere *if the surface of the sphere be flat or level or horizontal*! O, yes, Sir John,

certainly! Why, the earth is a globe—if a globe be flat! A beggar is a king—if a king be but a beggar. But kings are not considered to be beggars, and globes are *not* flat: so, Sir John, if your line “Mm” is perpendicular to the general surface, as you say it is, “in all situations, in every part of the earth,” the general surface to which it is related *must be level* “in all situations, in every part of the earth;” and, therefore, the surface of the earth is, generally speaking, a plane and not a spherical surface, and the earth cannot be a globe; and your diagram is just an illustration of *one* of the “false and fanciful theories” and “execrable superstitions” of which Sir Richard Phillips speaks.

“Suppose, then,” continues our author, “that at our station M we were to adjust a line (a wooden ruler for instance) by a spirit-level, with perfect exactness; then, if we suppose—” Stay awhile, Sir John. Suppose, for a moment, instead of adjusting a “wooden ruler” to such a nicety, we adjust our intelligence to the level of human reason, leave these flights of fancy to their fate, and look at the naked facts till we make them blush again for very shame. The fact is, you point to your diagram, and, with a rigmarole of X Y Z’s, you tell us that a certain angle in that diagram is the angle to the extent of which the “visible horizon appears depressed below the direction of a spirit-level,” and which is, therefore, the *dip of the horizon*. Here, then, again, you fail to tell us of the miserably insignificant figure at which the extent of this so-called “dip” is commonly estimated, and which is so minute that Mr. Glaisher leaves it out of the question altogether when he says anything about the matter, whilst you point expressly to the angle in the diagram, which we have spoken of before as being an angle of *forty degrees*, just as though you said to us ‘*That’s* the thing, but don’t say I told you.’ Faith! you take good care *not* to tell us! However, we may read something about this in *Thomas Bradley’s Practical Geometry* which ought to set this matter completely at rest. The author of this excellent work appears (as we shall see), when touching upon this subject, like a drowsy traveller, on a dark night, to whom a single light in the distance appears as two, but who is anything but certain whether one or both be real or delusive. Mr. Bradley says, in page 178, when speaking of the difference between a “visible” horizon and a “real” one, that the one “would differ very perceptibly” from the other; but that “the difference between them being but small,” when compared to something else, “they might be imagined to coincide;” and, “in the case supposed,”—which is the very case which alone led to the fact of the thing being mentioned at all,—our author says, “they would probably appear to be identical.” And now, let us mark well the fact, for it is very important, that all this difference and no-difference is concerning *two* things, the one said to be *real* and the other *visible*: so that, clearly, according to this, the *unreal* is the *visible*, and the *real* is the *invisible*. But the author has an astronomical foot-note at the bottom of the page, and, of course, he puts his foot in it: it would be a wonder if he didn’t. He says, “This difference between the real and imaginary horizon is termed, astronomically, the *dip of the horizon*.” But, how now! The difference is between the “*real*” and the “*imaginary*,” says the author. Now, since the *real* has just been shown by the author to

be the *invisible*, it follows that all this noise has been made about the difference between the *invisible* and the *imaginary*. In a matter like this, says "Common Sense," the *invisible* and the *imaginary* are one: there is, consequently, *no difference*, and, therefore, as it is said to be nothing more nor less than the "difference" which constitutes the "dip," it follows that, as there is *no difference*, there is *no "dip."* Again: since there is no difference between an imaginary horizon and a horizon that is *not* visible, there is no difference between the real horizon and the one that *is* visible. Mr. Glaisher is quite right, then, when he speaks of the horizon always appearing to be on a level with the eye of the observer "how high soever he may be," and Sir John Herschel is quite right in not attempting to tell us how much "dip" there is when there is evidently none at all. How much better would it be, then, for him to keep his false and fanciful diagram out of sight altogether, or bury it, with the whole host of "execrable superstitions," in well-deserved oblivion! So much, then, for the *dip of the horizon*; and so much for Sir John Herschel's attempt to make stock-in-trade of it.

Section 25 begins thus:—"From the foregoing explanations it appears, 1st, That the general figure of the earth (so far as it can be "gathered from this kind of observation) is that of a sphere or globe." Now, there is not the slightest doubt that, from what Sir John Herschel has said, and in consequence of the diagram which he has given, it *does* "APPEAR" that the earth is a globe. And there is not the slightest doubt that, from the observations made by conjurers, and in consequence of the clever manner in which conjurers take one's attention from the real point at issue, some very curious things *appear* to be done, at times. But what have thinking, reasoning men and women to do with what clever men can cause to *appear* to them! *They* have to do with that which *is*; with *natural* appearances, truly, as indicative of facts; and with "the truth, the whole truth, and nothing *but* the truth." But, in the place of this, it must be acknowledged by the warmest enthusiast in the astronomical world that all is, as yet, vague and visionary. Sir John continues: "In this we also include that of the sea, which, wherever it extends, covers and fills in those inequalities and local irregularities which exist on land, but which can of course only be regarded "as trifling deviations from the general outline of the whole mass, as "we consider an orange not less round for the roughnesses on its rind." Now, let us examine this. In the first place, we find that "*we*,"—the astronomers—"include," "in *this*," "*that* of the sea;" and what the *this* and the *that* are it is impossible to be certain: but one thing we *do* know,—and it is this,—that, whatever it be that is included in something else, it can only be that the *less* is included in the *greater*. But Sir John leads his readers to imagine, by his words, that the astronomers include the body of the sea in *that* of the earth, making, therefore, *all* we know of sea or ocean to be included in, or bounded by, earth or land. But the converse is the case. All we know of earth or land is included, its shores washed, and its bounds set, in and by, the unfathomable—the "*mighty—deep*." We do not *know* that those vast oceans which are stretched out in southern regions are *on* land; but we *do* know that land is *in* water. Do we want a witness? why not take an old one?

What does "Peter, an apostle of Jesus Christ," say, when he speaks of those whom he calls "scoffers?" He says, "For this they willingly "are ignorant of, that by the word of God the heavens were of old, and "the earth standing out of the water and in the water: whereby the "world that then was, being overflowed with water, perished." Why, this is worth infinitely more than all the volumes of learned trash about a *globe* being deluged. Our ministers may well give the whole question up in despair, and say that the Bible is not intended to teach Science—and we may well hear the scoffer's voice,—when modern Theoretical Astronomy is acknowledged to be the handmaid of Theology! The fact is, *one or the other must be wrong*—Peter or Copernicus: and he who says that *both* are right, proclaims himself devoid of reason. Hence, *thinking* men who *accept* the astronomical theories sneer at Peter and the like of him just so much as their manliness and moral courage will permit them to do; and hence, your philosophical *Free-thinker* is of men most free—he is, of men, *the man*. And why do we assert this to be the case? Because we are convinced that the language of a praise-worthy author, the Rev. J. B. Dodds, is quite true: "He who cannot "reason is a fool; he who dares not reason is a coward; he who will "not reason is a bigot; but he who can and dares to reason is a man." Well, then: since the less cannot contain the greater; since the oceans are many times greater in extent than the land; since Biblical authority is clearly on the side of reason and experience (and who can forget the words of the psalmist, "Him that stretched out the earth above the waters!"); since it is nothing but sheer absurdity on the part of Sir John Herschel when he says *In this we include that*—as though the astronomers really had the management of the universe, and the doing of impossibilities to boot: we unhesitatingly declare ourselves justified in subverting the gratuitous arrangement of Sir John Herschel, and in asserting it to be a fact, which we challenge the world to deny, that, so far as man's *knowledge* extends, it proves that earth is *in* the water, and *not* that the water is *in* the earth. Again: since we are professedly examining and exposing what the astronomers teach us, and the way in which they do it, it would be but a false delicacy that would prompt us to overlook *all* the mere *blunders* which our author makes as he travels along the road which is opposed to reason. If we see a man going where he has no business to betake himself, our risibility is *naturally* aroused at his difficulties, and we are apt to exclaim "What! stuck in the mud again, then!" Sir John Herschel has told us that "the sea," "wherever it extends, covers and fills in those inequalities and local "irregularities which exist on land." Does it? Of course, our author didn't *mean* to tell such a fib as this: but if people will travel along the swampy, unilluminated bye-ways of error instead of the sunny pavement of truth, certain it is, though they may expect immunity from serious consequences, danger and disgrace are at their heels.

Again: our author, in continuing to give the results of his "explanations," says that "it appears"—"2dly, That the appearance of a *visible* "horizon, or sea offing, is a consequence of the curvature of the surface, "and does not arise from the inability of the eye to follow objects to a "greater distance, or from atmospheric indistinctness." Now, we must

examine this little matter somewhat closely: for, although it is but one of two things which are said to "appear" in consequence of all that we have been told, it passes current amongst the mass of readers as a genuine and legitimate conclusion. Let us see, then, how woefully mistaken are all such as believe this to be the case. "A *visible* horizon, or sea *offing*," says the author: and this in a sentence which ought to be a model of perspicuity. Is this visible horizon (so emphatically expressed, too) in contradistinction to the *rational*, the *sensible*, the *true*, the *imaginary*, the *real*, or the *invisible* horizon? with all of which we have had to do! Surely, it *must* be visible, if it is an appearance. As to its being the "sea *offing*:" a more indistinct term could not be chosen. "*Deep water off the shore*," says one Dictionary; "*the open sea*," says another. Sir John himself, however, in section 20, has spoken of "*a sharp, clear, well defined line, or offing*:" so that it is plain enough that our author (whatever people in general understand it to be) uses the word *offing* as synonymous with *the horizon*. Well then, we may do what our author should have done: we may throw aside all ambiguity—reject all words that may stand for we know not what—and keep to the plain thing. We have, then, simply, THE HORIZON: and we trust that this is exactly what you mean, Sir John. And now we find "the curvature of the surface" mentioned. What is this!—a rise? Not a bit of it. We have long ago seen that the astronomers unanimously agree that it is a FALL of just so much in the first mile, four times as much in the second, and so on. How, then, does Sir John Herschel's conclusion read—with the tinsel rubbed off one part, and a new face put upon the other?—*The appearance known as THE HORIZON is owing to the FALL of the earth's surface!* How plainly absurd is this! But it is what Sir John Herschel says: with this simple difference only, that it is unadorned and intelligible in the form in which it is here shown. So that, in fact, the conclusion is this: that *The surface of the earth appears to RISE because, in reality, it FALLS!* Well done, Sir John! We are tempted to exclaim, "What next? and next?" Our author continues as follows, and thus concludes section 25:—"It will be worth while to pursue the "general notion thus acquired into some of its consequences, by which "its consistency with observations of a different kind, and on a larger "scale, will be put to the test, and a clear conception be formed of the "manner in which the parts of the earth are related to each other, and "held together as a whole."

"In the first place, then," says Sir John Herschel (in section 26), "every one who has passed a little while at the sea side is aware that "objects may be seen perfectly well beyond the *offing* or visible horizon "—but not the *whole* of them. We only see their upper parts. Their "bases where they rest on, or rise out of the water, are hid from view "by the spherical surface of the sea, which protrudes between them and "ourselves." Now, this language is careless, reckless language; and utterly unworthy of that regard which should be the due of the words of a teacher. '*A teacher!*' Sir John? If this is thy work, *thou art no teacher*. Young or old can glean *nothing* from the last sentence we have quoted from the book which bears your name save the most wretched idea of their mother tongue, or the most shabby display of truth that

they ever set eyes upon in any book with scientific pretensions on its face—unless, indeed, they may have seen the *Exeter Hall Lecture on Scientific Balloon Experiments*, or have read *Baron Munchausen*. But no one is deceived by reading such a book as *Baron Munchausen*, if even he be not much profited thereby: can we say this of *your* production, Sir John? We trow not. We cannot say, indeed, that the *Treatise on Astronomy* is intended to be deceptive: but it appears so, and the fault is not with us. He who has searched for the Truth and found much of it needs but to glance at the words of our author to be satisfied. Let the seeker after Truth go with us for a moment, and we will show him that he need not look in this “*Treatise*” for what he seeks. As nearly as our author’s words can be understood, then, they mean that the bases of certain objects the tops of which appear above the horizon are hid from our sight by a mass of water which intervenes between them and us. We have already disposed of a proposition to this effect which was presented to us by Dr. Lardner. But we must urge the truth again, and, still again, if need be. We now address Sir John Herschel: so that circumstances have somewhat altered. Now, Sir John—but, mark! as surely as God is, He knows our honesty of purpose, and is a witness to the fact that, if you be blessed with *superior* powers of reasoning or of simple perception, we conjure you to put us right, if we be wrong.—If the earth be a globe, we are on the *top*, and possess no knowledge whatever respecting *sides* or *bottom*. Is *this* true? You must admit it to be so, for the simple reason that it is self-evident, and that you have no plea upon which to ground a denial of it. The first step being true, we take another. If we be on the *top* of a globe, this globe must *curvate downwards*—even as your philosophical books tell us, though they say nothing of the consequences which would arise out of this if it were *true*. Again: If this globe, then, *curvate downwards*, and we be on the *top*, no object could really be *behind* what you have called “a spherical slice” of the said globe without being at the same time *below* us—and very far down below us, too: all your vaunted “refraction” notwithstanding. But, the horizon always appears on a level with the eye, no matter how high you as end, and, consequently, no matter how far distant that horizon may be from the place of observation. This you must also admit to be true, since it must appeal to your consciousness as being a fact, and since all efforts to prove the contrary have signally failed. What follows is just this:—*There can be no “spherical surface”—no “spherical slice”—existing between the eye of the spectator and the distant horizon which he sees.* The thing is absurd, and manifestly and demonstrably untrue. However, let us look at in another light: and this is one great beauty of Truth—you can look at it in any light you please, and *it shall still be true*; whereas every movement amongst Error makes the matter worse. If any portion of a sphere hide from us something the top of which thing so hid shall be level with the eye, *we could not be on the top of the sphere*, because it could only be the top of the sphere that would in such case intervene. But astronomers liken the earth to a sphere, and tell us that the phenomenon of which we have spoken takes place and that we are on the *top* at the same time! Again: If we

be on the top of a sphere, and there be something hid from our view by a portion of it, the thing so hid—ay, even the topmost portion of it—*could not be level with the eye*, because, in this direction, there would be no part of the sphere to hide it. But Sir John Herschel says (or, rather, would say, if he stated the case plainly) that the bases of things the tops of which are positively *above* the horizontal line—above the level of the eye—are “hid from view by the spherical surface of the sea, which protrudes between them and ourselves”! in which case the “spherical slice” must be standing above us like a huge mountain; and, it need also be absolutely transparent, in order that we might see even the *tops* of the objects the bases of which are hid. This, of course, is not the case: and thus the absurdity of the whole thing is seen beyond the shadow of a doubt. Our author gives a diagram, in the section we are now speaking of, which exactly illustrates what we say, whilst it condemns the theory which he himself brings before us! It consists of an arc of a circle, with a figure of a man mounted on a pedestal and supposed to be looking at ships as they gradually disappear first of all at the bottom. We have seen that if this disappearance were caused by the intervention of a spherical segment, the observer could not be on the top, nor could the horizon be level with the eye. And, lo! as though this was seen clearly enough, the diagram in question represents the man *on one side* instead of on the top, and the horizon *very far down* on the opposite side into the bargain! By means of this little bit of good management, the line of sight is rendered not quite so outrageously opposed to the truth as it would have been in either one extreme case or the other. But still it won't do, Sir John: for the whole thing is utterly false, and, therefore, it is beyond the power of any scheme to render it really true.

There is one point which must not be lost sight of, here. Our author says, when speaking of the ship that is disappearing as it recedes from the spectator (of course, in reference to the diagram), “When it has reached a certain distance, as at C, its hull has entirely vanished, but the masts and sails remain, presenting the appearance *c*. But if, in this state of things, the spectator quickly ascends to a higher station “T, whose visible horizon is at D, the hull comes again in sight; and “when he descends again he loses it.” Now, it must be clearly seen, if we give this one moment's consideration, that this fact is of itself an all-sufficient proof that the hull of the vessel is not hid by a segment of a circle which is said to be five-and-twenty thousand miles in circumference! Just imagine a man flattering himself that he is playing at *hide-and-seek* with the hull of a vessel behind a segment of such a circle as this! The thing is ludicrous in the extreme. Fancy him “quickly” ascending—there's the hull, *in sight*! See him as “quickly” descending—the hull is gone! Where? Where? Sir John! If we were foolish or knew no better, we might believe that it was down *below*—on its journey to the *antipodes*,—that it was really *behind* a mass of water—as all the smaller astronomers teach us. But, mistake not. Sir John Herschel does not say this—and it would never do for him to *correct* the “false and fanciful theory” which he has “taken for granted, from the outset.” Certainly not. Truth seems to be as light as a feather when

pride swaggers into the opposite scale. Our author says, "The ship still receding, the lower sails seem to sink below the water, as at *d*, and at "length the whole disappears." So the lower sails "SEEM to sink below the water," do they? *Shilly-shilly!* Why, there is scarcely a plain, matter-of-fact statement to be found in your book, Sir John. The sails *seem* to sink below the water, we know: but they *do not* sink. What a pity it is that the conventionalities of society should load such a man as you with chains so heavy, that you are compelled, in your diagram, to show us the ship sinking down, down, down; and, whilst you dare not say that it is *false*, you dare not say that it is *true*!

Again: strange though it may seem, this diagram (in section 26) is accompanied by a smaller one which, whilst it is intended to be a sort of *aid-de-camp*, is just as much opposed to it as it can possibly be. This small diagram is intended to represent the sea in "*plan*," as it would be termed, whereas the other one is intended to give it in "*section*:"—the one, in fact, a straight-forward view, and the other, a side view. The sectional or side view is the one we have spoken of in which the line of sight from the figure of the man to the horizon is in a downward direction at a considerable angle—about forty-five degrees. This, of course, pictures the surface of the sea as being on the surface of a globe. The one we have now to consider, however, represents the surface as it really is—as level as possible! There is the horizontal line as straight as an arrow—a physical impossibility, if the earth be a globe! But how remarkable it is that the truth will even come out side by side with error. This straight-forward plan, then, shows the horizontal line; and also two ships (marked "*a*" and "*b*") *in sight*, one (marked "*c*") half *out of sight*, and one (marked "*d*") with merely the top of the sail visible. Sir John, with reference to this diagram, makes the following remark:—"the distinctness with which the last portion of the sail *d* is seen is "such as to satisfy us that were it not for the interposed segment of the "sea, A B C D E, the distance T E is not so great as to have prevented "an equally perfect view of the whole." Now, these references allude, in the last two cases, to the *sectional* diagram, whereas the first reference is to the *plan*: thus identifying the false diagram with the true. But that is not the point: it is this:—If the top of the sail be so distinctly seen, how far can the ship be from us? Five?—six?—say ten miles! There is the ship, then—at ten miles, we will say—*going—it is gone!* Now, this would be a long distance to see "the last portion of the sail" with anything like "distinctness." But, say, it has disappeared to the unaided vision at ten miles; and we have a telescope that will "define" an object at *twenty*! How is this? 'O,' says one, 'the object seen must be *bigger*, then!' 'No,' says another, '*we* must be *higher up*!' 'Well,' says a third, '*I* can't understand it at all: if we alter the conditions, of course it will affect the results—we may as well talk of '*going over* to the thing, at once: we should see it, then, clearly enough. 'But, the fact is, a telescope is supposed to answer these several means 'at once, and to enable us to attain the desired end by merely *looking through it*. However, if that ship is behind the water, as our worthy 'astronomers tell us, *all telescopes are useless*.' Now this *would* just be the case: but we know it is the reverse. All we have to do is to try

the experiment. There is a vessel, yonder, just going out of sight: all we can see is a little bit of white sail. Never mind the distance: if it be twenty miles off, we can get telescopes to "define" thirty; and if it be thirty, we can get telescopes for forty. Now! get the right *focus*; *there is the vessel—the whole of it—even to the water line!* And yet we are told by Sir John Herschel, with seeming gravity and earnestness, that a "spherical surface" positively "protrudes," and that the "interposed segment of the sea" is that which hinders our vision! Why, the people of Folkestone are responsible for the assertion that they can see, on a clear day, through a good telescope, the hay-makers at their work on the coast of France. And why not? We have not seen the *hay-makers*: but we have seen that which anyone may see, as well in December as in June, ship after ship, many miles off, clear down to the water's edge—we could not learn how far beyond the limit of unaided vision. The conclusion is inevitable and incontrovertible, and may be arrived at by all who are willing to wipe prejudice from the eye and uncleanness from the telescope, that *there can be no "spherical segment" interposed, and that the bare mention of the thing is an absurdity.*

Sir John Herschel commences section 27 as follows:—"In this manner, therefore, if we could measure the heights and exact distance of "two stations which could barely be discerned from each other over the "edge of the horizon, we could ascertain the actual size of the earth "itself: and, in fact, were it not for the effect of refraction, by which "we are enabled to see in some small degree *round* the interposed segment (as will be hereafter explained), this would be a tolerably good "method of ascertaining it." If we bear in mind the object which our author has had in view, namely, to enable us to form a "conception" of the shape and size of the earth, preparatory to the formation of that *grand* "conception," the earth's motion, we shall understand, at once, that he imagines he has settled the question of "shape," and that he is quite free to discuss the question of "size." Sir John begins, however, (whether he feel satisfied or no), to discuss this second question. And how does he set about it? Why, by presuming so confidently upon the validity of his previous arguments, and the soundness of his conclusion, that he builds this second course of reasoning upon the first, and; in fact, forms this out of the very substance of the other. The consequence is that they are both rotten together. Miserable as is the task, still we must show that this is truly the case. We have seen, then, that Sir John talks of being enabled to "see in some small degree *round* the interposed segment" by, or in consequence of, "the effect of refraction." Refraction itself, then, is *not* a cause enabling us to see what we should not see without it; but "the effect of refraction" *is*. This is as though our author had said that 'the *effect* of alcohol produces intoxication!' instead of the alcohol itself producing it. We are so frequently put in mind of the foggy, muddy path in which the astronomers feel their way, it makes one imagine himself to be uncomfortably begrimed when he does his best to be clean. But how the truth will slip out! What *can* this "refraction" do, then, if there is no refraction in the case? What injury can alcohol do, if there be none to drink? We know well enough that if we put a coin inside an empty basin, and stand just so far back

from it as to lose sight of it behind the side of the basin which will then be "interposed" between the eye and the coin, the pouring of water into that basin will cause the coin to make its appearance, as though it had been lifted up. This is an example of what refraction is. In this case, *the object is UNDER the water*. Are the ships which have been spoken of, or the "stations" now under consideration, *under the water* as well? Is there the smallest resemblance in the two cases? Can there be any refraction where the essential conditions are wanting? Our author may well talk (with his usual clearness) about being enabled to see "*in some small degree* round the interposed segment"! Astronomers speak of things *infinitely* large: it would be well if, when they mean to speak of something *infinitely* small, they would just say so; and then, if we were none the wiser, we should, at all events, not suffer the thing to trouble or deceive us. Our author now gives a diagram, which he proceeds to explain. It is, this time, an arc of a circle—and we know what this is *intended* to represent—with two "eminences" thereon: one on each side towards the top, and marked, respectively, "A" and "B." These two eminences are so nicely arranged that a line drawn from the top "A" to the top "B" will exactly rest upon the top of the circular arc at a point marked "D." Let us see, now, how exactly this arrangement humours the necessities of the case without satisfying them. Here we find a perfectly straight line—the horizontal line, of course—on the top of a spherical arc! This is certainly in harmony with nature, *as far as the line goes*. But, alas! for the straightforwardness of this diagram: there are no little figures to be seen perched on the top of the two eminences (as there *ought* to be), looking towards their common horizontal point "D," in the centre! O, no! Why, this would have made the thing look ridiculous upon the face of it, whereas, now, it *appears to be quite natural*. But any one may supply the deficiency in imagination. Presto! see the little man, on the top of the left-hand mountain, looking over towards the horizon at "D," and another doing the same thing on the other hand. See the two figures as they necessarily lean forwards beyond their "centre of gravity," at the imminent risk of falling over the face of the mountain! They are now at right angles with the horizontal line, just bearing that relationship to it which a plumb-line sustains: but how frightful the situation! Again: quickly we can imagine these little figures depicted as though they intended to maintain their uniformity of direction with the centre of gravity of the mountain, —a feat which they are quite justified in attempting to accomplish! But, lo! in order to see along the horizontal line, they have to look *straight down the nose*! Truly, in the one case the thing is impossible, and in the other case the thing is ridiculously absurd. Does Sir John Herschel, then, take one or the other horn of the dilemma, as he is in duty bound to do, and throw the whole affair down with disgust? Not likely. He sees that these little figures would appear so abominably awkward in whichever manner they might choose to conduct themselves, and, moreover, tell such ugly tales about the theory which they should support, that they have been—left out altogether.

But we must just describe Sir John's diagram as we find it. The arc of the circle with the two mountainous projections upon it is a complete

semicircular arch, with a point marked "C" at the base of it as it stands before us, which, of course, would be the centre of the circle if it were completed. This point "C," then, is the point of meeting of three lines (radii of the circle): one drawn straight downwards from "D" (the top of the arch), and two others, one on each side, from those portions of the arch (marked "a" and "b") which stand at the bases of the two mountains. This, with the two mountains themselves and the level line which connects them, completes the diagram: except, indeed, that the two lines (the radii) connecting the bases of the two mountains with the central point "C" are continued upwards through the mountains from the bottom to the top, thus forming in each case a line which instead of being called a *radius* is called a *secant*. All this descriptive business is very dry work, we must admit: we promise, however, to get through it as quickly as possible. What would astronomers say were a single point omitted?—not that it was a matter of *small* moment, we are quite sure. Sir John Herschel says this:—"Suppose A and B to be two eminences, whose perpendicular heights A a and B b (which, for simplicity, we will suppose to be exactly equal) are known, as well as their exact horizontal interval a D b, by measurement; then it is clear that D, the visible horizon of both, will lie just half-way between them, and if we suppose a D b to be the sphere of the earth, and C its centre in the figure C D b B, we know D b, the length of the arch of the circle between D and b,—viz. half the measured interval, and b B, the excess of its secant above its radius—which is the height of B,—data which, by the solution of an easy geometrical problem, enable us to find the length of the radius D C. If, as is really the case, we suppose both the heights and distance of the stations inconsiderable in comparison with the size of the earth, the solution alluded to is contained in the following proposition:—*The earth's diameter bears the same proportion to the distance of the visible horizon from the eye as that distance does to the height of the eye above the sea level.*" Now, what is to be understood by this? We find that the heights of the two stations and the distances between them are known exactly; and yet, to find the diameter of the *supposed* spherical earth, we have to "suppose both the heights and distance of the stations *inconsiderable* in comparison" with that very thing with which they are then immediately brought into comparison! For we find that what Sir John has here been describing to us constitutes "DATA" which are to enable us to find something by the solution of a problem which is not given, but which solution is itself contained in a proposition which only becomes a proposition when we imagine that to be of no importance which nevertheless is made an essential element in it! The fact is, it may safely be asserted that any collection of words as heterogeneous as possible would contain as much sense and convey as much information as the words which we have been considering. Again: the interval "a D b" is called a "horizontal" interval, whereas it is manifestly an arc of the circle; and our author speaks, as we have seen, immediately afterwards, of *supposing* it to be "the sphere of the earth"! Sir John Herschel says, and thus concludes the section, "When the stations are unequal in height the problem is a little more complicated." Really, it would be a treat to see such a

problem as this; but the amount of truth likely to be found in the solution of it would be problematical indeed!

Sir John Herschel continues as follows:—“(28.) Although, as we have observed, the effect of refraction prevents this from being an exact method of ascertaining the dimensions of the earth, yet it will suffice to afford such an approximation to it as shall be of use in the present stage of the reader's knowledge, and help him to many just conceptions, on which account we shall exemplify its application in numbers. Now, it appears by observation, that two points, each ten feet above the surface, cease to be visible from each other over still water, and in average atmospheric circumstances, at a distance of about 8 miles. But 10 feet is the 528th part of a mile, so that half their distance, or 4 miles, is to the height of each as 4×528 or $2112 : 1$, and therefore in the same proportion to 4 miles is the length of the earth's diameter. It must, therefore, be equal to $4 \times 2112 = 8448$, or, in round numbers, about 8000 miles, which is not very far from the truth.” We have heard it said that ‘*A miss is as good as a mile* :’ certain it is that if one doesn't hit the truth, he misses it. With astronomers—to whom a million of miles is a mere unit—what “not very far from the truth” means, it is impossible to say : but, at least, we have a tacit admission that *it has not been hit*. It matters not, then, how far Sir John Herschel is from the truth; it is quite sufficient to know that he is in error. The diameter of this fictitious earth (and it would now be correct to call it “an” earth) is, we find, as arrived at by Sir John Herschel's arithmetic, “8448, or, in round numbers, about 8000 miles.” Certainly, a more “round-about” statement it is seldom one's bad fortune to meet with. But the idea of cutting off 448 miles to bring the figures to round numbers is so outrageous when found to be part of an exact science that it is enough to make the critic blush. It is said by some astronomers that the “diameter” is 7920 miles. And, the fact is, if Sir John Herschel had been moderately cautious in the use of his figures, he would have produced this result without the least trouble whatever. The starting-point with Sir John was 10 feet : and it must be clear to everyone that, in starting with so small a distance and ending with *thousands of miles by multiplication*, it will never do to omit a fraction. Yet our author has done so ! It is as bad as reckoning the wages of an artisan for a number of years at so much an hour when the accredited rate *per hour* is a fraction short of the true amount. We could not look over such a thing as this in a *small* employer ; but is it not outrageous in a *great* astronomer ? This is just how the matter stands :—If it be true that “an earth” curvates at the rate of eight inches in a mile, and this amount *increases as the square of the distance in miles*, at four miles (the distance of which Sir John speaks) it **MUST BE** 10 feet and *two-thirds*. This amount, then, instead of being the “528th part of a mile,” is the 495th part of a mile ; four times 495 differs from “four times 528” just as much as 1980 differs from “2112” ; and four times 1980, or 7920, is the exact diameter according to many astronomers : so that the whole business might have been transacted in strict accordance with the theory of curvature, thereby saving Sir John the trouble of cutting off four or five hundred miles to get to round numbers,

and being "far" away from the truth after all. Really, it seems as though Sir John *saw* that this would *prove too much*! The fact is, anybody may see how one part of the Copernican theory is intended to fit every other; and this little matter of the diameter removes any lingering doubt.

But it may be said, 'How is it that Sir John speaks of *four* miles when he began with *eight*?' The question may well be asked. It is, in fact, just a case similar to that which is put to an inexperienced child by one who knows a little more about things in general when he says '*Think of a number—double it—halve it,*' and so on. The poor child thinks that the process is very important, and does not see that in reality it might as well have been left alone. Ay, but it *leaves an impression* behind it—so does Sir John's *doubling* and *halving*—and a *wrong* one, too. Besides, what Sir John says is untrue: that is, it is unharmonious—out of gear—with his own theory; and serves only to throw dust in the eyes of the reader respecting the nature of that theory, and to keep him from seeing its hideous deformity. To speak of *two* objects being invisible "from each other," at *double* the distance, without keeping in mind, on the other hand, the *corresponding increase of curvature which would exist according to the ratio of the accredited theory*, can only be placed on a par with tricks in trade—alas! so common. *Forty-two feet and two-thirds* is the distance which "an earth" is supposed to curve in *eight* miles: so that what Sir John says about what *appears by observation* is no more like the theory which he then works upon than black is like white. If it "appears" "that two points, each ten feet "above the surface, cease to be visible from each other" "at a distance "of about 8 miles," as Sir John Herschel says, why, the fact of the matter is (even allowing, for the sake of argument, that the disappearance be owing to curvature, though it is not), Sir John *then* proves no more than that "an earth" is a thing *immensely larger* than our astronomers generally tell us it is. But Sir John Herschel surely must know that there is no curvature at all to be found (except in theory), and that the whole thing is either a shameless assumption or else one of the "execrable superstitions" spoken of by Sir Richard Phillips.

"Such," says our author, "is the first rough result of an attempt to ascertain the earth's magnitude." It is "rough." No sensible man, however, would think a bit about the roughness, could he but believe that the thing would pay for the polishing. Those who have kept by our side during our little astronomical journey know better than this; and they know, too, that all "attempts" to attain the object in view, whether on the part of Sir John Herschel or anybody else, must in the nature of things prove as rough, as unscientific, and as valueless as this. "Such," then, is the *alpha* and the *omega* of all distinctive attempts to give us a bare "conception" of the fundamental principles of that theory which Sir John Herschel himself admits having taken for granted at the outset of his investigations. Neither the shape nor the size of the earth according to the Copernican theory has been laid before Sir John Herschel's readers, although Sir John himself has told us that these things are of primary importance. And thus, step by step, have we gone over the root of the whole thing, and laid bare its rottenness to every thinking man. Hence, it is proved to be utterly unworthy of the

confidence that is reposed in it: for no reasonable man will believe for a moment that a tree or its fruit can be sound when he knows that the root is rotten. Shall we, then, go over every branch to examine its leaves, when we must even now have a clear impression of their deadly condition? No: it is enough. Those who desire to do so may examine every leaf of Sir John Herschel's book, but we tell them beforehand that they will not find one that is not spotted and ill-favoured by reason of the radical unsoundness which is at the bottom of it. We are now become quite tired of the author's very name, and imagine that this feeling must ere this have crept over the minds of all who may have journeyed along with us. We drop Sir John Herschel's book, then: reserving the right to take it up as occasion may require us to allude to it. Promises, however, must not be treated like pie-crust. We agreed to show, before we left our author, that there is a wide discrepancy between the so-called "dip of the horizon" according to the diagram which he gives us and the words he uses *much further on in the book*. In section 50, we read as follows—and we must now bear in mind that our author assumes the earth to be in full swing without having so much as thrown out a hint that the thing may be *considered* as having been *proved*:—"A spectator on the earth's surface is prevented, by the great mass on which he stands, from seeing into all that portion of space which is below him, or to see which he must look in any degree downwards. It is true that, if his place of observation be at a great elevation, the dip of the horizon will bring within the scope of vision a little more than a hemisphere, and refraction, wherever he may be situated, will enable him to look, as it were, a little round the corner; but the zone thus added to his visual range can hardly ever, unless in very extraordinary circumstances, exceed a couple of degrees in breadth, and is always ill seen on account of the vapours near the horizon." Here, then, we find that, *with refraction and all*, the downward view is *said to be* "a couple of degrees," thus making a total "depression" below the horizontal line of—*four* degrees instead of *eighty*! Comment is needless. He who accepts modern astronomical theories after all that we have even now said (and much yet remains) will accept anything.

And now that we have nearly arrived at another stage in our journey, it will be well to look around and survey our position. Where are we? What have we learned? We are on the highway of Truth; and we have learned little or much just in accordance with our capacity to imbibe the truth when presented to us. Some will say 'Show us the *new* system, then'; and nothing else will satisfy them but some elaborate *Treatise* of four or five hundred pages just within the means of a select few of God's well-to-do creatures to purchase and peruse, whilst honest John the ploughman is looked upon as an ignorant clodpole—something beneath a man—because he knows nothing of "universal gravitation," or of "the accumulation of imperfectly compensated actions of the tangential force," or the thousand other "execrable superstitions" of the Newtonian school. Tut, man!—we would say to one of such a class of persons as this—you have been befogged long enough: get out of it. He who follows the plough can be taught in an hour—and perhaps knows even yet—as much of the *truths* of Astronomy as you. The old

Book of Nature costs nothing; it has been given to man for his perusal; every page is beautifully illustrated with coloured scenes full of life and motion; whilst perfume and song invite us out to the study of it. Pore over your musty, worm-eaten tomes, if you will: they were made by man; perhaps they'll suit you. But for us! we want the strongest proof that Nature lies, before we set aside her teachings. She says—*The earth is a level, extended plane.* And proud enough are we to say *Amen* to such a teacher as she—*she*, the Mistress of all Art and Science, yet having no name, no title! She says—*The sun goes, daily, round the earth, in horizontal circles, appearing to rise and set whilst approaching or receding.* And however men may sputter forth their theories in opposition to the fact, Dame Nature does but laugh full well whilst they amuse themselves as they do. Nature says—*The earth is motionless.* And man who boasts of reason—as well he might did he but use it—says that Nature is deceiving him! He says that the earth moves; then swears that it don't; again says "*It does move, though;*" becomes a martyr for the sake of his whim; and an admiring world would immortalize GALILEO as it would COPERNICUS and NEWTON. But where is the proof of the earth's mobility—or rotundity? *Not in Sir John Herschel's book!* Who will tell us where we may find it, before we give the matter up? Astronomers! you make no sign. One of your number—fresh, fiery, from the Greenwich Observatory—says, in the first number of a new *Shilling Magazine* which shone forth, like a meteor, in the month of May, 1865, "We will assume that the reader is aware "that the motions of the sun and stars round the earth are only *apparent*, and are produced by the *real* motion of the earth." Ministers! you make no sign. One of your number says, in a tract published at sixpence a hundred, under the banner of the *Sword and Trowel*, in the glorious month of July, 1865, "This huge round earth is sustained in "its orbit without prop or pillar, by the unseen power of the Almighty "God." And there's the picture of it, too!—a picture of by far the most absurd of all the "execrable superstitions" that have ever tickled the fancy of modern man—*the earth as a globe in mid-heaven!* We beg leave to commend to Astronomers the Gift of Reason, and, to Ministers, "Revelation;" and to recommend the words of *Peter* of old to both the one class and the other. But far above those of class or creed—those fettered minds who hear of freedom but know not its charms—do we esteem the independent, the fearless, the indubitable Truth-Seeker: and we say—God speed to you! You *know* that we have not led you from the right path, but rather *into* it, if influence we have had over you at all. God speed to you! then: and search not amongst the fusty book-stalls for some other *System* now that you are becoming disgusted with Newton's: but out into the fields with you, and rustle amongst the tinted leaves of the Book of Nature; pore over its pages and be true to its teachings; be sure that what you see is especially adapted to your comprehension, and that all you see is right and need deceive you not; continually bring your reason to bear upon what may appear to be obscure; and for ever hold in remembrance, as your bright, your omnipresent, guiding star, the fact that the Author is One who cannot err, —THE GREAT, THE OMNIPOTENT GOD!

Theoretical Astronomy Examined and Exposed.

OPINIONS OF THE PRESS.

THE CHURCH TIMES, FEBRUARY 11, 1865.

[Continued from wrapper of Part IV.]

"We wish, however, to this particular "Common Sense," that his shadow may never grow less. He is one of the most amusing of his tribe. We all know of Goldsmith's dog which—

... "to gain some private ends

Went mad, and bit the man."

and this is just what "Common Sense" supposes astronomers to have done, and what Protestants hold the Catholic Church does continually. "Common Sense" insists that the world is flat and that the sun goes round it. "Whatever seems to be, is," may be taken as his motto. We don't feel the earth moving, therefore the earth doesn't move. The sun appears to rise and set, therefore he does move. A few astronomers have differed considerably as to the sun's distance from the earth, therefore all astronomers are wrong, and for their private ends have bitten the public with the same idea. We cannot give a better specimen of "Common Sense's" argument than this, which we take the liberty of putting in our own words. Messrs. Glaisher and Coxwell have gone up in a balloon to the height of two miles. When at that altitude the horizon appeared at the level of their eyes, and the space within the horizon seemed concave instead of convex. Therefore, says "Common Sense," the world is not round but flat—and Scripture is vindicated from the aspersions of Modern Science! Well, to tell truth, we never began to despair of Scripture until we discovered that "Common Sense" had taken up the cudgels in its defence.

"We beg the reader to believe that we should not have devoted so much of our space to "Theoretical Astronomy Examined and Exposed," but that we think it an apt illustration of a prevailing principle. "Common Sense," we gather from the notice of a contemporary, reprinted on the cover of one of the three "parts" before us, is a clergyman—or at least a Dissenting minister, for the use of the words "Protestant Divine" by the ILLUSTRATED NEWS proves nothing either way. He is the only even partially logical Protestant we have ever come across—for what is a Protestant but one who protests at whatever he does not understand? Now "Common Sense" certainly does not understand astronomy.

"But how many writers are every week "instructing the people" on theology, and the base efforts of ritualists, and the glorious effects of Protestantism, and the deplorable results of Puseyism, who know just as much of these questions as "Common Sense" does of Astronomy! It is their cue to run something down—and what better than that which they have studied, if studied at all, only that they may pick holes in it? Macaulay in his Essay on Milton has a passage which fits well in this place. He says:—"In every venerable precedent" a certain class of men "pass by what is essential and take only what is accidental, they keep out of sight what is beneficial, and hold up to public imitation all that is defective. If, in any part of any great example there is anything unsound [in their eyes] these flesh flies detect it with an unerring instinct, and dart upon it with a ravenous delight. If some good end has been attained in spite of them, they feel, with their prototype, that

"Their labour must be to pervert that end

And out of good still to find means of evil."

We do think that all the Protestant journals ought to give "Common Sense" a lift. He is quite of their kidney—and though his publication amounts to a *reductio ad absurdum*, they ought not to forget their friend because he has brought their principles to a logical test. The MORNING ADVERTISER, we are happy to know, has already recognized the obligation by puffing him. Cannot Mr. Whalley use his influence to get this "Protestant Divine" well noticed?"

Our readers will be pleased to hear that "PARALLAX," the Founder of the Zetetic Philosophy, has now (Sept. 1865) issued a volume entitled "Zetetic Astronomy—Earth not a Globe," which is published by Simpkin and Marshall, price 3s. 6d. This Work treats the subject in a manner which must carry all before it, and sweep the present outrageous system to the winds and the waves.

Price One Penny.

THE EARTH NOT A GLOBE.

By "COMMON SENSE."

THIS Pamphlet is intended to be an Introduction to the subject of which it treats; and to awaken in the mind of the general reader a consciousness of the untruthfulness of the modern theory of Astronomy, as well as a desire to know how the matter really stands. Copies may be obtained at a cheap rate, for private distribution, of the Printer and Proprietor, South Street, Greenwich.

Published and sold by

JOB CAUDWELL, 335, STRAND, LONDON.

William Carpenter, Printer, South Street, Greenwich.

THEORETICAL ASTRONOMY

EXAMINED AND EXPOSED:

By "COMMON SENSE."

THE EARTH'S MOTION.

"I dare say every person whom I see here has been brought up in the belief that the earth does turn round. But I ask if they had not been brought up in that belief, whether they would believe it now from what I am telling them? I do not think they would. Amongst all the subjects of natural philosophy presented to the human mind, there is none that staggers it so effectually as the assertion that the earth moves. We must not be uncharitable then towards people in the middle ages who did not believe it. To think that the solid earth moves—that the solid ground is going round at the rate of one thousand miles an hour—do you believe it?"—Professor Airy's Ipswich Lectures.

CONTENTS.

Professor Airy's Ipswich Lectures to Working men.....The Earth's Motion ... "Do you believe it?" ... Professor Airy's "grounds for the belief" ... Characteristic Language ... Likelihood, Probability; Magnitude.....An Assumption to explain an Assumption 'So much the worse for the Facts!' ... Regularity and Punctuality ... "Seeming" to Move, and Moving "Sensibly" ... A "Strong Proof." ... "Immoveable," and "Fixed." ... 'IF the Stars BE Fixed, WE MOVE!' ... The Grand FACT, on Professor Airy's own authority "Why DO NOT We Turn?" ... What it is that "baulks" the Astronomers ... The Astronomical Gem! ... Perspective ... "Something Curved!" ... How it is that Ships Circumnavigate the Earth ... St. Paul's Cross ... "Something Round!" ... A CHALLENGE for Professor Airy...The Zenith Sector ... The way in which it is said to be used, a Delusion or a Fallacy! ... The Leak in the Ship of the Astronomer Royal ... ABSOLUTE and RELATIVE Position ... The Telescope and the Plumb-line—Which is it that is moved? ... How the Telescope "IS TO BE" pointed ... The Accommodating Instrument!The Sinking of the Ship!The Name of the Ill-fated Vessel,—The "Error." ... End of Chapter VI.

LONDON:

JOB CAUDWELL, 335, STRAND, W.C.

CHAPTER VI.

IN the year eighteen hundred and forty-eight, PROFESSOR AIRY, the present Astronomer Royal, delivered a course of lectures, to the working men of Ipswich, on Astronomy. Since eighteen hundred and thirty-five—at which time, says Sir Richard Phillips, he commenced his duties “with a salary of £800., besides a pension of £300.”—has Professor Airy held the highest astronomical position in Great Britain. What the Professor said to the working men of Ipswich is now before the world *not* in the columns of some local newspaper but in the form of a handsome volume of some 250 pages, upon which Professor Airy, as he tells us, spent “considerable labour.” Thus we see that it is no longer from the stand-point of a little platform in Suffolk that we have the words of the Astronomical Professor, but from a stage which has the whole world before it, and the echo from which never dies. How important it is, in all such cases, that “considerable labour” *should* be borne; and how natural to expect that the thing brought forth shall be sublime, and not ridiculous. Let us see how it fares in the present instance. Professor Airy says, in the volume before us, “I dare say “every person whom I see here has been brought up in the belief that “the earth does turn round. But I ask if they had not been brought “up in that belief, whether they would believe it now from what I am “telling them? I do not think they would.” Again: “Amongst all “the subjects of natural philosophy presented to the human mind, there “is none that staggers it so effectually as the assertion that the earth “moves.” And again: “To think that the solid earth moves—that “the solid ground is going round at the rate of one thousand miles an “hour—do you believe it?” These are the words of Professor Airy, in his *Ipswich Lectures on Astronomy*, addressed to working men!

If it was the intention of the Astronomer Royal to compliment working men, then, indeed, did he carry it out—if, however, it was to magnify Theoretical Astronomy and to honour its professors, then did he signally fail—in his *Ipswich Lectures*. Working men have brains: and, though these frequently seem to be out of use, they never get rusty. Working men have, indeed, been “brought up in the belief that the earth turns round,” but how was the Professor brought up? Why, precisely in the same way: his own words bearing direct evidence of the fact. If the highest authority in the land admits that he could tell us nothing that would make us believe that the earth moves if we had not been “brought up” in the belief of it, the fact is, *he, himself*, can be in possession of no such knowledge: it is, therefore, simply *belief* on *his* part, as it is on that of other people. But it is imagined that Professor Airy *must* know; and this is just where people are wrong: for *He does not!* Brought up as Professor Airy has been, in the same way that others

have, *his* prejudices are similar to *their* prejudices; and the theory which "stagger" those who only occasionally have it presented to them fails to "stagger" those who deal it out because they are *so used to it*,—that is all. It is like the tippler with his dram: he is able to drink, at one draught, that which would well-nigh choke a decent man, and think nothing of it! *But who shall be the judge of the right or of the wrong*—the hardened devotee or the sensitive inquirer? *He* shall be *right* whose cause needs no defence; *he* shall be *wrong* whose cause has no defender. Professor Airy tells us that "the human mind" becomes "*effectually*" staggered with "the assertion that the earth moves." True! and here is the difference—for there should be a wide one—between the astronomer and the tippler: whilst the one appears as if he could not say too much in praise of his favourite toddy, the other is silent—he cannot say too little, or sing too small—about his pet theory! Unless, then, our Astronomer Royal have a mind that is more than "human," *he*, like the rest of us, is "*effectually*" staggered. Let us see. Professor Airy gives us a taste (and scarcely this) of the theory of the earth's mobility, and then says, timidly, "Do you believe it?" No, we do not, Professor Airy: it is not true! We do not believe that we are "going round at the rate of one thousand miles an hour," because the "assertion" has never yet been proved to be in reason. But why talk of "*one thousand*" miles an hour? It is like giving us a spoonful of diluted liquor to try its effect upon the constitution, whilst strong, neat spirit is in store for us when, perchance, we get a morbid appetite for it. *Sixty-eight thousand miles an hour* is the rate at which the earth is said to travel in its journey round the sun! Professor Airy speaks about this, certainly: but not until the *Lectures* are well-nigh concluded, and a state bordering on bewilderment and intoxication is morally certain to have been fairly brought about in the minds of his wonder-stricken hearers! Look at the thing with sober-mindedness, Working men—you, the muscle and backbone of your country. *Your own Astronomer Royal* pointedly asks you if you *believe* that the earth moves round at the rate of *one thousand* miles an hour; we ask you if you *believe* that it travels round at the rate of *sixty-eight thousand* miles an hour, which, of course, is considerably more than *one thousand miles a minute*! *This* is the dram which was given to the working men of Ipswich! *This* is the potion which is now being given to you from the astronomical gin-palaces of England. And *this* is the outrageous thing which is given to your children! They will believe it, too, as a matter of course, unless you put them right. Confiding, simple-minded people can be made to believe *anything* which Ignorance or Wilfulness gives them with a serene countenance or a scientific air. This question, then, you should answer: not to an AIRY, not to us, but to yourselves. Put it to your own minds, and wait for the reply: or, peradventure, your children may find the Truth somewhere across their path, and you may unwittingly chide them for their "foolish" acquirement! Do you believe, then, that the earth on which you stand is whirling round through the heavens at the rate of one thousand miles an hour "*on its axis*," and at the rate of *sixty-eight thousand* miles an hour "*in its orbit*?" Or, in other words, Do you believe *not only* that the earth *rotates* at the rate of

"one" thousand miles an hour, but that it *revolves* at the rate of *sixty-eight* thousand miles an hour, as the astronomers tell us? Professor Airy thinks that you are too sensible to do anything of the sort, even as to "one" thousand out of the sixty-eight; and that he, your Astronomer Royal though he is, is too impotent to urge anything that would *compel* you to believe *this*, unless you had first been "brought up" to it.

What says Professor Airy, in the next place? "I will endeavour to 'give you grounds for the belief.'" Working men: does it not seem incredible that a "Professor" of an "exact" science, in the nineteenth century, should employ such words as these? But the Astronomer Royal is wise; he promises not more than he can perform: he can give you *grounds for the belief* very easily—in fact, you scarcely need them: you have had them, in some form or other, from your school-days—but *he can give you no proof!* Professor Airy, with all his mechanical appliances and skilful Assistants, *cannot prove the earth to be a globe*; and for him to prove that *it moves* is equally impossible: he, therefore, promises to "endeavour" to give us "grounds for the belief."

What, then, are these *grounds*? Professor Airy says, in page 56, as follows:—"In the observations given in the former lecture, we found 'that the whole of the Heavens appeared to revolve, and we say, either 'the Heavens revolve in the direction from east through south to west, 'or the earth revolves in the direction from west through south to east. 'Which of these is the more likely?' What think you of this, good Working men? What you have so long believed, and you are now having drilled into you again, is only a matter of likelihood after all! But let us see how it is that it can be said to be at all "likely." Our Astronomer Royal tells us that "It appears that the system of heavenly bodies which surrounds the earth is of considerable size." Pray mark this characteristic language! Does it mean anything at all? Why, the term "*considerable*" can be applied as well to the size of the grain of sand blown beneath the eyelid of the traveller as to anything else! But here is the policy of using the word: though it means nothing, it goes a long way. Professor Airy says: "Now is it more likely that 'this large frame of things is turning one way, or that this small earth 'is turning the other way? Anybody must see at once from the magnitude of things that it is most probable the earth is turning round." Working men, be not deceived! The term "*magnitude*" means just as much as the term which we have already shown means nothing at all; and the term "*great*" means no more than the other two put together: but, by a most unwarrantable assumption, these three terms, which, take them how we will, mean just nothing, are made to indicate a size which is bigger than the earth itself. The Astronomer Royal has an unquestionable right to apply any adjectives he pleases to the heavenly bodies so long as they mean nothing definite, because this is just the extent of our knowledge of these bodies; but when he calls these "*large*" and the earth "*small*," we say 'Stop, Professor: this will never do!' Professor Airy is *utterly at a loss for a proof* that the heavenly bodies are larger than the earth; but, by a little piece of verbal ingenuity, by which three nothings are made to mean *something*, working men, all at once, have brought before their wondering minds—a specimen of the

sort of "grounds" which their own Astronomer Royal has prepared for them, and which, *we* should imagine, "anybody must see at once" are as specious and as untenable as they could possibly be.

But we have other "grounds" given to us. The Professor says, in page 33, "Inasmuch, therefore, as all the stars appear to revolve uniformly round one axis, it follows that the stars keep their relative places or positions, that is to say, the Heavens turn as it were all of a piece. Of course," continues Professor Airy, "there is no explanation of that, except one of these two—either that the Heavens are solid and go all of a piece, or that the Heavens may be assumed to be fixed or immoveable, and that we and the earth are turning instead of them." Now, when the Astronomer Royal says "*of course*," working men believe that it really *must be* "*of course*." Not so is it, however! Here we have presented to us a choice of two "assumptions" by way of an "explanation" of something!—as though an assumption could ever be an *explanation*! And of what? Why, *of an assumption*, positively! Look well to this, Working men: be sure that *we* are not playing a trick with you. It is evident that the Professor imagines that the stars "turn as it were all of a piece" because they *appear to revolve uniformly*: but Reason and Common Sense no more warrant this supposition than they would that of a regiment of soldiers turning "all of a piece" should the *men* turn *uniformly*. But Professor Airy, as we have seen, first makes the gratuitous assumption, and then, very considerably, gives us a choice of *two*, namely, the original one and a fresh one, to *explain it*! The first assumption is this:—that "the Heavens turn as it were all of a piece." "*All of a piece!*" *The idea of explaining such a thing as this—a mere star-gazer's reverie!* Just as though the stars were golden rivets in a huge revolving plate of steel; or, indeed, as though the heavens themselves could be what Professor Airy calls them (in page 8), "a shell in which the stars seem to be fixed." Let Professor Airy take the bare, undistorted *fact*, if he wish to explain anything. The fact which stands before us is simply this:—"The stars appear to revolve uniformly" round one point, and, thus, to "*keep their relative places or positions*." What can the Astronomer Royal do for us, however, by way of *explaining* a thing so plain as this? Nothing at all: the fact is as clear to the ploughman as it is to the astronomer. But Professor Airy was "brought up in the belief that the earth turns round:" he must, therefore, accommodate the *facts* to the *theory*, and, peradventure, exclaim, with the would-be philosopher, "*So much the worse for the facts!*" Accordingly, the Professor mystifies the fact in question, then loses sight of it altogether, and attempts to explain his own mysticism as though he were dealing with GOD'S TRUTH. And, just as it frequently happens when the further a man goes in the wrong road the deeper he sinks into the mire, Professor Airy, in his attempts to explain his first assumption, only makes the matter worse. The two assumptions given by way of explanation are impossibilities and absurdities: and yet we are to take unto ourselves either one or the other!—"either that the Heavens ARE solid and GO ALL OF A PIECE," or that "*we and the earth are turning!*" And "*of course*," too! O, no, Professor Airy: there is no "*of course*" about this. Is it impossible.

then, that the stars should revolve and maintain their relative positions around the North Star, as it *appears* they do? Is *regularity* to be ignored, whilst the most undeviating *punctuality* is admitted, in the motion of the heavenly bodies? Certainly not. Now let us turn, for a moment, to page 11, in the volume before us. We read:—"I simply call attention to the fact, that the stars move all in a piece." Here, then, in the guise of a "FACT," we find one of the two *assumptions* which we have just had given to us; and, strange to tell, it is the very one of the two which is rejected as being not at all "likely" when a choice comes to be made! And the Professor continues:—"either that they are connected "with some one thing turning upon an axis, or that they stand still "while the earth turns round an axis of its own; one or other of these "things is certain." Thus we find another mode of presenting the two *explanatory* assumptions: one of the two is rendered ludicrously absurd, in order that the *other* may be accepted as being true!—either the stars move just as the Professor indicates, that is, "in connection with some one thing" (of which he knows nothing), or they do not move at all! All that can, with reason, be said, is, that the stars *do* move just as they *appear* to move: and who has any *right* whatever to "assume" anything to the contrary? *Prove* that the earth moves—find one jot of evidence of the truth of the supposition,—*if it be possible*; and *then, and not till then*, begin to imagine that the stars be fixed although your senses tell you that they revolve. But our Astronomer Royal promised to give us "grounds for the belief" that the earth moves, and that the stars do *not*: and so we have had *assumption* presented to us to place alongside of *likelihood* and *probability*! And now that these three things are put on one side, let us see if our Astronomer Royal has any *solid* grounds at all to give us. He says:—"As regards the stars, the mere circumstance of "their seeming to move all in a piece is a strong proof that they do not "move sensibly, but that the earth moves." Now, Professor Airy, it would be a sheer piece of impertinence to throw out so much as a hint that you knew no better than this: since it requires so small a measure of intelligence to comprehend the fact that, if anything *seem* to move, it moves "*sensibly*," without even a shadow of doubt—the only question at all fit to be entertained being as to whether the thing moves *really and truly*. But what you tell us amounts to this:—*The fact that the stars DO seem to move is a "strong proof" that they DO NOT seem to move!* And, if anything more ridiculous than this is to be found, we should like to see it. "*But that the earth moves!*" O, no, Professor Airy: at least, not until some unforeseen mental calamity happen unto us, which God forbid!—not on the strength of such "reasoning" as this. *Reasoning!* Why, we should not know *what* to call it, if you had not advised us, in the very next line, to "apply the same reasoning to any ordinary sublunary considerations." Leaving the absurdity of the thing out of the question, and putting it in a reasonable form, we ask you, Is the fact that the stars *seem* to move *as they do* any evidence at all that they *do not* move *as they seem*? Why, if we were to do as you propose—"apply the same reasoning to any ordinary sublunary considerations,"—what a muddle we should be in! The mere circumstance of a writer appearing to state the whole truth would be a "strong proof" that he told a big

falsehood ; and the mere circumstance of a lecturer appearing to make egregious blunders would be a "strong proof" that he spoke nothing but good sense. But, *mark!* Working men: when you hear of a "*strong proof*," rest assured that it is *no proof at all, but mere assumption still*. Did you ever hear of a school-boy working out a *strong proof* of his arithmetical exercise? Never: unless the strength had left the boy's wits. Professor Airy, having, then, no PROOF to give us, is determined to make up this deficiency by giving us plenty of "grounds for the belief." In page 59, we read as follows:—"But when we have things of such an "immoveable character as the system of the stars (like that of the banks "of a river or the solid erections which are there visible, as compared "with our small sailing ships,) then the reason of man tells him at once "that these things must be things of a fixed character;"—Working men: believe us, or believe us not, these are precisely the words which your Astronomer Royal addresses to you; and they are just these and nothing more in sum or substance: *When we have things of an immoveable character, our reason tells us that they are things of a FIXED character!* Why, if you were to hear such talk as this from one of your own class, you would immediately exclaim, in your own peculiarly unmistakable and characteristic language, '*The fellow is trying to humbug us!*'—"and if these things," continues Professor Airy, "be things of a fixed "character, it is we who are turning and the earth which goes round." *IF the stars BE fixed, WE MOVE!!* Positively, this takes away one's breath through sheer astonishment. Professor Airy cannot say that the stars *are* fixed, and that we *do* move: but, *IF* they *BE* fixed, *WE MOVE!* *IF, then, the stars MOVE, WE ARE FIXED.* Let the Astronomer Royal assert the one thing, and it follows that he must admit the other. *The stars DO move*, Professor Airy: and *the Earth does NOT!* We have your own words to prove that you *know* it, too. Well, indeed, may you ask working men, in your second lecture, if they believe that to be, which, *in your first lecture*, you show *is not!* In your first lecture, then, you show that the stars *DO* move—that they *revolve*. Here are the words. Working men: mark these words particularly; let each sentence strike with its full force upon your minds. In page 5, Professor Airy says:—"If we look out on any fine night, the first "general fact that we observe is this—by watching that eastern horizon "from time to time, through the whole extent from north to south, we "see stars are rising; and by watching that western horizon from time "to time, through the whole extent from north to south, we see that "stars are setting." Again:—"The next general fact which you will "observe is this—that the stars do not rise perpendicularly: they rise "obliquely." And again:—"If you look to the north, and give your "attention to those stars which are fairly above the horizon, you find "the stars going round and describing a complete circle." These words are plain enough: but hear what Professor Airy says, in page 7, as though the fact could not be too firmly fixed upon the mind:—"It is "important that any person, who wishes to understand Astronomy, "should look into the matter, and see with his own eyes that the stars "really do partake of these motions; that the Polar Star does nearly "stand still; that the stars at various distances from the Polar Star,

“do move round in the way I say, one in a circle of one size, and “another in a circle of another size: that others do move round in “circles still larger, so that at their lowest points they just touch the “north horizon; that others move round in circles so large that the “lower part of these circles is lost whilst the higher part rises above “the horizon. It is of importance that anybody, who wishes to understand Astronomy thoroughly, should look out and see for himself that “these things do happen in the way I have attempted to describe; by “the observations so made he will acquire a conviction of the truth far “deeper and more lasting than from any thing that can be pointed out “in a course of Lectures.” Working men! see what safe ground the TRUTH is; see how firmly the Professor treads whilst he is on *this* road; and mark the striking contrast between the language which he here makes use of, and that language which, in other places, seems to make use of *him*. By looking out at the stars, and observing their movements, you will “*acquire a conviction of the TRUTH far deeper and more lasting than anything that can be pointed out in a course of Lectures:*” and yet, in pursuing the Lectures which the Professor gives you, you find that he “endeavours” to furnish you with “grounds for the belief” of a thing which is the very opposite of this very Truth. Again: in page 15, Professor Airy says that, in consequence of *experiments* and *computations* and *corrections* and *observations*, “it is proved that the “whole thing comes quite right—that the stars move exactly in circles, “not approximately, but (as far as the human eye and instruments can “discover) exactly as if they turned uniformly round one imaginary “axis. This” says the Professor—and *don’t forget it, Working men,—This “is the grand fact, and which must be regarded as the foundation “of astronomy. IT IS “THE GRAND FACT,”* Professor Airy! And thus have we proved, from *your* words, that *THE STARS MOVE*, and that you are *not* ignorant of the *fact*. And now, just to prove that in your heart of hearts you know that the earth does *NOT* move—and although this conclusion follows as a matter of course after the other one,—we give your own words as we find them in page 60. Here they are:—“Jupiter is a large planet that turns on his axis, and why do not we turn?” Mark, well, the words, Working men:—*Why DO NOT we turn?* Here you see not only that your Astronomer Royal knows that “we” (meaning, of course, the earth and its inhabitants) do not move, but that he would *like* to know “the reason *Why?*”—“O, but,”—you exclaim—“he don’t *mean* to say this; he means to say—” Stay! Friends; how shall you know what the Professor means, except through what he *says*? We admit, however, that *this* is a difficult matter; for all through the book there runs a deep vein of contradiction which seems almost interminable. Indeed, the greatest wonder in the world would seem to be that the Astronomer Royal should know what he really *intends* to say; and certainly it is no wonder that any *other* person than he should be confounded with what he really *does* say. The Professor says, in page 59, when speaking of the arguments we have brought forward, “This is reasoning which ought to be received; and I cannot “say why it was not received by those who were able to reason on the “*matter in more distant times.*” Of course, no one would expect the

Professor to say the "reason why;" but, surely, he must know that "those who were able to reason on the matter" would have been fools if they HAD received such "reasoning" as he presents to us. Besides, the very fact of the Professor saying that his reasoning ought to be received is quite sufficient to show that there is no reason in it: for, reasoning MUST be received, though it be not admitted; it is received until it be overthrown. How much more would it become a "Professor" to take the sure road, and reason thoughtfully, carefully, and truly, come what may, so that not only should his reasoning tell in the manner in which only true and just reason can, but that he himself should know that his labour has not been completely thrown away! It must now be sufficiently evident that Professor Airy, in his endeavours to give us, in so many words, some "grounds for the belief" that the earth moves, has signally failed; and that, on the other hand, we have had the strongest assurance that can possibly be afforded, as given to us by the Professor himself both wittingly and unwittingly, that it is the *HEAVENLY BODIES* which MOVE, and the *EARTH* which DOES NOT!

And now arises a question of some importance, and it is just this:—If Professor Airy has given us no grounds for the belief of the earth's mobility, where do we find them? The answer is ready. We see them in the fact that "*Professors*" preach the doctrine: this is quite enough for human nature, until some sharp collision takes place and rouses individuals from their lethargic state to one of inquiry and action. It has been thought to be quite sufficient that the matter be left in the hands of those who profess to "see" to it, and to "believe" implicitly all they tell us concerning it, even though these professors themselves admit it to be "hard" even for them to "receive" the conclusions which follow their own train of "reasoning,"—Heaven save the mark! But this is the century of cheap literature and of dear inquiry. Thinkers are stirring, and balloons are in the wind; steam puffs all over the earth, and electricity flashes from beyond the seas, at the bidding of man. Newton and Galileo and Copernicus are dead; and their superstitions are beginning to die out too. One by one they go: a sly stab from a supposed friend, a heavy kick from an avowed enemy, and a noisy disputation on the part of enthusiastic malcontents or would-be administrators, well-nigh put out the vitality of those even now dragging on a useless existence. There is not a working man to be found who ever was or who ever will be convinced that the earth is a globe or that it moves, in consequence of any arguments in Professor Airy's *Lectures*. If so much as the weight of a feather be added to the force of anyone's belief in these dogmas through the existence of the book in question, it can only be because the Astronomer Royal wrote the book, and because the believer has neglected to read it. Read the book, then, Believer! and mark that there are more "grounds for the belief" given to you on its cover than in its pages; and learn, too, the fact that not even a Professor can teach you anything worth knowing unless it be firmly based upon the "grounds" of reason and of common sense.

And now, what says Professor Airy concerning the doctrine of the earth's rotundity? In the table of *Contents* of the volume before us, we read that a "*Proof of the Roundness of the Earth*" is to be found in

page 47. To prove the earth to be a globe is the drift of the *Lectures* from first to last; and it forms the difficulty which, above all others, astronomers would fain get out of. Professor Airy says "*Refraction* is "a thing which baulks us perpetually, and which it is very desirable to "get rid of as much as possible;" but "*Refraction*" is as nothing by the side of "*Rotundity*." This is the *incubus* which "baulks" modern astronomers much more than does anything else. But here is promise of *Proof* held out to us! Here is the very page which contains the precious document! Let it be printed in golden symbols, and let not a word be lost! The Astronomer Royal says:—"I dare say that there "are many persons here who have come by sea from London to Ipswich, "and have observed Walton Tower rising out of the edge of the waters. "Many persons too who have gone across the Irish Channel, have seen "the mountains on one side disappear, as if they dipped into the sea, "and they have also seen the mountains arise out of the sea on the other "side, perfect in shape, coming out by degrees just as if seen rising over "the brow of a hill. The inference is, that the water is curved to pro- "duce these phenomena. These are to be seen in the course of ordinary "expeditions; but those who voyage further, those who have gone to "the Cape of Good Hope, know that, as they go on, every night they "lose sight of our stars by degrees, and other stars come up on the other "side. In a southern latitude they lose the northern stars, and they "get more of the southern stars. All this leads us to the conclusion "that the earth is something curved. Again, people have sailed round "the earth. This was done for the first time by Magellan and his "successors in command, and for the second time by Sir Francis Drake. "From the time of Sir Francis Drake this has been done every year; "ships are indeed almost daily prosecuting such voyages. It is a com- "mon thing for ships to sail in an easterly direction to Australia, and "to return by continuing their eastward course, and not by coming back "the same way they set out. The earth, therefore, roughly speaking, "is something round, and there are limits to its extent." Thus have we brought out into the light of day this—gem, shall we call it? If it be not a gem, it should be, direct from the Astronomer Royal's own casket! Here it is, however: we cannot alter it, or change it for another,—we would not if we could: We can but show it forth in all its purity and lustre—the astronomical Koh-i-noor. If it be the gem it purports to be, we shall merit the approbation of the jeweller; if, however, we should prove it to be mere paste—prove that it was got-up in the workshop, and not formed in Nature's own laboratory,—we shall then deserve the thanks of those whom we shall have undeceived: but, in the nature of things, we—wish we may get them. The truth is, as a rule, people do not care to be undeceived: and, after all, it is but one of the many curious phases of human nature.

Let us proceed, then, to put this *gem* into its most favourable light. First of all, we read, that many persons have journeyed "by sea from London to Ipswich," and have seen "Walton Tower rising out of the edge of the waters!" Of course, these are nothing more nor less than impossibilities and absurdities: but, then, is not astronomy full of such things? Again: we read of persons having seen "the mountains arise

out of the sea!" but, then, no such thing is to be *understood*: and is not this the peculiar mode in which astronomers *habitually* clothe their expressions? and, if it trouble not astronomers, why should it be allowed to chafe other people? We must understand (and consider it to be a fortunate thing that we are able so to jump at the conclusion), simply, that the mountains *appeared as though they did rise*. What, then, is the cause of the phenomenon of Walton Tower and of the said mountains *appearing* to rise from the water's edge? Professor Airy says, "the water is curved to produce these phenomena." Now, water, though it may be *curved to produce these phenomena*—that is, curved, *theoretically*, by Professor Airy,—is not curved *naturally*. O, no. It is a mere temporary affair: as though the Astronomer were to say that 'it is *curved to get over a difficulty*,' or, '*curved to fit the Newtonian theory*,' that is all. In fact, that Professor Airy *can mean no more than this* is evident from his words, in page 26, which are these:—"As the quicksilver is perfectly fluid, its surface is exactly horizontal." Professor Airy cannot (or must not) forget what he has said about the *quicksilver*, when he is speaking about the *water*. *Water* is "perfectly fluid," everyone knows: therefore, *its* surface, like that of the quicksilver, is "exactly horizontal." So that we must not imagine that we have weighty words to deal with, but words which, like snow-flakes, fall lightly and soon melt away. But *the cause of the phenomenon*: what is it? We will re-state the fact, and then *give* the cause of it. First, then, the lofty object, whatever it may be, in the distance, appears to the observer with its base or lower portion cut off by the horizontal line formed by the intermediate land or water, or both, as the case may be. As we approach the object, we see more and more of it—more of the base—until the whole is visible. *Thus* the object appears to rise out of the "edge of the waters,"—the *edge* being, in fact, the horizontal line fronting the object, and extending right and left of it. As we *leave* the object *behind* us, the effect is simply reversed. And now for the *cause* of the appearance described. Level or horizontal surfaces, whether of land or water, appear to rise, in the distance, to the height of the observer's eye. This is an incontrovertible fact, with the cause of which we have nothing to do (at least, for the present). The observer, situated but a few feet above any surface in question, is at an insignificant distance from the ground line, if this distance be compared with that at which we imagine the distant object to be situated: so that the line of his vision very soon becomes in unison with the ground line, and, therefore, is carried along with it to the horizon—the limit of the general range of vision. Now then, if there be some lofty object behind or beyond the horizon—some object which, being *much* larger than surrounding objects, does not appear to be diminished as they do in consequence of their distance,—its *base* will be *hidden* from view *not* because the intermediate land or water is really between the eye of the spectator and the object in a straight line, but because the *line of sight*—merged, as it may be said to be, in the ground line—is carried onwards to the elevated object necessarily **AT THE SAME ANGLE** as that of the apparent rise of the ground line itself: and *thus* is CUT OFF from view a section of the base of the object proportionate to its real distance beyond that spot which is on the horizontal line at the general limit

of vision. And, as a *proof* of this being the true cause of so much of the object being cut off from view, and that it is *not* in consequence of any *curvature* at all, the *fact* may be urged, that, if, by means of a telescope, the horizon be magnified and apparently brought closer to the eye of the observer, *the object will then appear to have risen* in the field of view, in consequence of a *greater portion of its base being visible*. And now it follows that, just as we approach the object, *the same effect is produced*: so that the inference formed by Professor Airy, that "the water is curved to produce these phenomena," is refuted beyond even a shadow of a doubt. In a word: the whole thing is fully explained by the principles of PERSPECTIVE, concerning which the astronomers appear to be utterly ignorant.

Again: we read of the fact that voyagers lose sight of the northern stars as they journey southwards, and that they see more of the stars belonging to the southern parts as they travel towards these stars. Is there anything extraordinary in this? The very same principles of Perspective most completely and satisfactorily and undeniably account for all this, *without the necessity of inventing the utterly inexplicable and romantic THEORY of the earth's rotundity*. But our Astronomer Royal believes this *theory* (or, at least, his words make it appear so), and we find that the *fact* is brought in as a "*proof*" of the *theory*—a "*proof*," indeed, if we take the "*Contents*" for it! What are the words in the *gem* before us? "*All this leads to the conclusion that the earth is something curved.*" *Something curved!* What is your unbiassed opinion of this language, Working men? You are led to expect a proof that the earth is a *globe*, and what you *get* is not worth so much as the name of a proof (and so it does not receive it) that the earth is even *something curved!* We tell you, and you will admit the fact if you *reflect* for one moment, that it is Professor Airy's *name* which carries the weight, and not his "*conclusions*" given to you where *proofs* are wanted. *Something curved!* We can't forget it. If it be not a miserable burlesque, it is closely allied to this sort of thing. One point there is, in this part of the *gem*, which we particularly wish to be borne in mind, and the reason will by and by be clear. It is this:—As travellers journey towards the "Cape of Good Hope"—that is, as they go southwards,—"*every night* they lose sight of our stars by degrees." This is a *fact* of great value: and be wise enough to retain it, Working men, although you reject the Astronomer's conclusions.

Once more—for the *gem* is a three-sided one:—"People have sailed round the earth." And—People have walked round London. What of it? Why, it only asserts a mere fact. It proves, most assuredly, that it is *possible to walk round London*: but this does not so much as prove that *London is ROUND*. And yet, the mere circumstance of "sailing round the earth" is to be taken as a proof not only that the earth is *round*, though it may be "as flat as a halfpenny," but that it is *round*, in the sense of being *spherical*, like a ball or an orange! And why! O, faith, because the ships do not come back "the same way they set out." Just as though, if you walked round London, it would be at all *likely* that you would *come back the same way that you set out!* Well, but we read, that ships "sail in an easterly direction," and, "continuing their

eastward course," get back again. And what does *this* prove? Why, only that they have sailed "*round*" in a circle having the north point in its centre: just as it would be possible to walk in the same way round London, if, for example, the Cross of St. Paul's Cathedral represent the North or Polar Star, and the compass always point towards it. This being the case, longitudinal meridians simply radiate on every hand about this central spot like the spokes of a wheel towards its circumference: the north end of each spoke being always in the centre of the wheel, and the south point of each being at the opposite end—*every point in the compass being always merely relative to the central one, a circle round which would necessarily be due east and west throughout the whole of its course.* We could then take an easterly or a westerly journey round our 'guiding star,' and get back again, too (just as Professor Airy says the ships do), without "coming back the same way:"—and *this is ALL that has ever been done in this way by navigators!* Again: according to the distance at which we are from St. Paul's when we start out on our supposed journey, so would be our *latitude*. A walk round St. Paul's Churchyard would represent a journey round the "North Pole" (as it is called) in a very *high* latitude, with the North Star in close approximation to the Zenith of the observer—the point immediately over his head. In fact, this position would represent, completely, the position in which arctic travellers find themselves *when, in consequence of being near the centre of the Sun's daily course, they are enabled to see this luminary throughout the whole of his horizontal journey!* Again: a walk round the outskirts of London would be a journey at a distance from our supposititious North Star quite sufficient for *this* star to appear depressed by a considerable angle: thus representing a journey round the earth in a *lower* latitude. And again, a long walk round the environs would represent a voyage round the earth (in a "great circle," if you please), with the North Star in the horizon, or, in a latitude as *low* as the amount of the Star's altitude. And now, a walk *from* St. Paul's to any point in the environs would represent a journey on the earth from north to south; and at every step we took we should be losing sight of our "North Star"—the Cross at the top of St. Paul's—by degrees, until, at last, it would appear in our horizon on a level with the eye, and then be lost to our vision altogether: precisely in the same way as voyagers to the Cape of Good Hope lose sight of stars which would be over their heads if they were to sail in the opposite direction.

Well then: why not call London with its environs a *globe* at once, since everything is possible with respect to it which has been predicated concerning the earth; and since each of these things has been thought to be sufficient to make a globe of it? But, stay: *we have only been led to believe this!* Professor Airy did not promise to prove that the earth is a globe. O, no: he only promised to prove the *roundness* of the earth, and has not even done this! What are the Professor's final words in the *gem* which we have been examining? Why, simply these:—"The earth, therefore, *roughly* speaking, is *something* ROUND, and there are "limits to its extent." What do you think of this, Working men? *Something round!* Is not a halfpenny, or the crown of a hat, something round? and you know, well enough, that crowns and halfpence too are,

certainly, *limited*. But, the earth is *something round*! Well, and so is London "something round!"—"something" round which it is possible to travel: nothing more. Professor Airy proves no more than this, in his *very* rich, *very* "rough" gem, concerning the earth which you have so proudly maintained to be as round as a cricket ball! Thus has it been shown that the astronomical gem given to us by our Astronomer Royal is a thing of no value whatever. And we *challenge* Professor Airy—very respectfully and deferentially, of course,—in the name of "Common Sense," and on behalf of the Working Men of England, to show, by any means at his command, either that the earth is a globe or that it bears even the smallest resemblance to anything of the sort.

Professor Airy, after having given to the Working men of Ipswich a thing which is supposed to be a proof of the earth's rotundity, or, rather, of its sphericity, proceeds to show, by perhaps the most unbecoming mode ever devised by scientific skill, that the earth is round or spherical! But what signifies the mode when the thing to be done defies all modes! If we turn again to the Table of *Contents* of the volume before us, we shall get at the pith of the next branch of the subject—the *programme* of Professor Airy's next piece. We read as follows:—"By the use of the Zenith Sector the direction of Gravity at any Station is found, and by comparing the directions at two Stations, whose distance is known, the semi-diameter of the Earth can be deduced." This is, unquestionably, a most promising affair! By the use of a nice little instrument, we are to have the earth brought before our minds in its exact dimensions: so that not only shall we be enabled to imagine it to be a globe, but also to talk about the size of it. Alas! many a good ship has been sunk by a small leak. We have a stately vessel before us; astronomers reckon her A 1; her Commander is bold, resolute, and skilful:—*but she has a leak in her hold!* And, if she don't go down, *never* a ship went down. Working men: if you go with *us*, we will show you the leak, and you shall be satisfied; if you go with the ship, may good luck fall on you, for you will be sure to stand in need of it. We will point out the leak at once. Here it is, in page 49:—"The place of the star, however, which I observe, is unaltered." It will be said that there seems to be nothing remarkable in such words as these. True: this is why we point them out. It is the *unfortunate situation* in which these words are placed which renders them fatal to Professor Airy's argument. There is no more to be feared in these words when standing alone, than there is in a hole in a ship's bottom when the vessel is high and dry: but surround these words with others with which they *should be* harmonious but with which they *are not*, and your mere hole becomes a dangerous leak which you cannot overlook. Working men: keep your eye upon these words when they come across your path in the course of the argument. We see that an instrument called a Zenith Sector is brought into the service of Professor Airy, to answer a certain purpose. This instrument is a very simple one, and it shall be described in the Professor's own words. Referring to an engraving, Professor Airy says, "the Zenith Sector, Figure 19," is "a telescope swinging upon pivots A B, and having attached to it an arc C D E graduated into degrees and minutes. There is a plumb line B E connected with the upper end of the teles-

"cope, or with one of the pivots ; it is a very fine silver wire, supporting "a weight F, which weight is hanging in water to keep it steady." It will be seen at once that the instrument is, mainly, a telescope and a plumb-line hanging side by side in such a manner that, by looking upwards through the telescope, any star in the Zenith (or immediately over head) will be seen. It must be distinctly observed, however, that the "arc" which is spoken of, and which is marked off into degrees, is *fixed to the telescope* very near to the eye-glass at the lower end. Move, now, this telescope, in order to observe a star *not* in the Zenith, and the plumb-line *then* hangs *not in the centre of the arc* as it did before, but so many degrees from it as the star is from the Zenith. And why? O, clearly, because *the telescope and the arc attached to it have been moved away from the plumb-line*. And mark what the Professor himself says of the *plumb-line* :—"It gives us the direction of gravity there, or the direction of the perpendicular to the horizon." And then, what he says of the *telescope* :—"Assuming that we are observing a star G very nearly "overhead—it is plain if the telescope be directed to the star, then by "observing the point of this divided arc CDE which is crossed by the "plumb-line, I have got a measure in degrees, minutes, and seconds, of "how far the star is from the vertical." The whole thing is as clear as daylight, that, by this instrument, we can ascertain *just* this :—"How far" a "star is from the vertical,"—the relative position of a star being in accordance with the observer's place on the earth's surface,—the *plumb-line* being the STANDARD of comparison.

"Now then," says Professor Airy, "the way in which this instrument "is used, in order to ascertain the form of the earth, is as follows." We must here observe, the Professor has given us a sketch of a section of the earth's surface—curved as he imagines it to be—as "Figure 18," showing a Zenith Sector at one end, B, which indicates Balta, one of the Shetland Islands, and another Zenith Sector at the opposite end, A, or at Shanklin, in the Isle of Wight,—the two places being apart from each other, in a direct north and south line, a distance (as the Professor "supposes") of "830 miles." *In the diagram, the telescopes of the two instruments (marked CD and cd) are parallel one to the other, and the two plumb-lines are drawn one leaning to the right and the other to the left!*—one crossing the "arc" at a place near to its centre, and the other at a place some 12 degrees distant from it! "We take our Zenith "Sector" continues Professor Airy, "to Shanklin Down and to the "Shetland Islands. Now consider for a moment. What do I mean by "the earth and water being curved? The direction of gravity is perpendicular to the surface of water; and therefore if the water be "curved, it is connected essentially with the circumstance that the direction of gravity is varied, or that the direction in which the plumb-line hangs is not the same at different places. Therefore if the earth, "Figure 18, be curved, as we suppose, and as previous rough considerations have given us reason to think, the plumb-line at A would hang "in the direction CGF, and that at B in the direction *cgf*. The place "of the star, however, which I observe, is unaltered. The telescope is "to be pointed in the same direction, whether we use it at Shanklin or "at Balta : or the line CD is parallel to *cd*. Suppose therefore, I have

"gone through the observations in the way I have described, by observing "what part of the limb of the Zenith Sector is crossed by the plumb-line; I get different parts of the limb in the observations at these two points. When I am observing the star at Balta, the plumb-line crosses at *g*; when I am observing it at Shanklin Down, the plumb-line crosses at *G*. Thus we obtain the difference of the direction of "gravity at the two places." Working men: the argument has been fully brought before you! Did you observe the *leak*—big enough to cause the largest ship to founder!—"The place of the star, however, which I observe, is unaltered."? Yes, Professor Airy, so it is! Go to the Cape of Good Hope, on that journey in which, as you have told us, voyagers, "as they go on, every night lose sight of our stars by degrees:" and, though the "Polar Star" shall appear to sink from its elevated position clear down to the horizon, still you would be able to say—"the place of the star, however, which I observe, is unaltered." Again: turn your back to St. Paul's, and walk from the spot until, by degrees, the Cross appear to be *low* instead of *high*, you could then say—"the place of the Cross, however, which I observe, is unaltered!" O, yes, Professor Airy: but be good enough to observe just this:—Working men are not quite so ignorant as not to know the difference between *relative* position and *absolute* position! *Absolute position* is out of the question altogether: and you wisely kept it out until some foreign expedient became *absolutely* necessary to save a break-down. Although the *absolute* "place of the star," with which you had nothing whatever to do, "*is unaltered*," the *relative* "place of the star," which is the point in question, IS NOT "unaltered!" And as your argument depended entirely upon this one thing, which we have proved to be utterly false, it falls to the ground—and your ship is sunk! But, why did you stand in need of something to keep the star fixed? O, because "*The telescope is to be pointed in the same direction whether we use it at Shanklin or at Balta!*" For "*eight hundred and thirty miles*," then, we are to travel, *directly southwards*, and yet point the telescope in the *same* direction at both of the places of observation, to view a given star! IMPOSSIBLE!! Why, the very nature and object of your Zenith Sector, by your own words given at a time when you did not happen to be trying to *prove* anything, is, to find "*how far the star is from the vertical!*" But now, it seems as though you intend that we shall be made to believe that the object of the instrument is to enable us to find out *how far the vertical is from the star!* Then, it was the telescope which was to move in its *relative* position to the plumb-line; now, it is the plumb-line which is to move in its *relative* position to the telescope! This is very convenient, certainly. First, you had such a beautiful instrument for getting "*a measure in degrees, minutes, and seconds, of how far the star is from the vertical*," and at last, when the thing is brought into use, its real purpose is forgotten, and it is used as a lever to overthrow the very foundation upon which it stands: but, like many a thing put to a use for which it was never intended, it has turned out to be a miserable failure.

And now let us look at the object which Professor Airy had in view when he started on his disastrous voyage. It is very clear. If we look at the sketch of the earth's surface (Figure 18) which has been given to

us, in that curved form in which the Professor "supposes" and "thinks" the earth really is, and also at the two plumb-lines which this astronomer says hang just as they "would hang" "*IF* the earth *BE* a globe," we shall see that, if the two plumb-lines were continued downwards, they would *meet* at a point which would be the centre of the earth, and, *then*, (to use the Professor's words) "the whole thing comes quite right." Professor Airy *did the wrong thing when he marked out his course on the chart before he started the voyage*. We see the exact course of the astronomical ship as it *would have been if the ship had not sunk*. Alas! the name of the ship was "Error." Professor Airy will *never* realize his object. He *cannot* prove that the plumb-line varies its position, or that the telescope maintains it, in two observations with the Zenith Sector at different places on the same meridian. It is *impossible* for him to make even Working men believe that, when they travel southwards, the North Star will "sink," and that when the Astronomer travels in the same direction with his magic Sector the star will *not*. It is *useless* for him to think that he can teach Astronomy with success by employing slipslop language, and fast and loose arguments. And, in the face of every fact in science, it is *absurd* to attempt to prove the earth to be a globe, *rotating on its axis, and revolving about the sun*.

Professor Airy says, "*If the water*" (or the face of the earth) "*be curved, it is connected essentially with the circumstance that the direction of gravity is varied, or that the direction in which the plumb-line hangs is not the same at different places.*" Well then, what says "Common Sense?" Just this much:—*As there is no such thing as the "circumstance" spoken of, there can be nothing—"curvature" or what not—"essentially," or in any other manner, connected with it; and, as there is NO curvature of the surface of the earth, the earth remains, in spite of modern "philosophers," the level extended PLANE which our forefathers held it to be.*

Working Men! we have brought under your notice the groundwork of Professor Airy's *Lectures* to you: what think you of it? Professor Airy! we have taken leave to point out a few inconsistencies, mistakes, contradictions, sophistications, and delusions, as exhibited in these your *Lectures*; we have put them forth in language which a child may easily understand; we give them to the world in good faith, and with an earnestness of purpose which no amount of blatant ridicule shall alter; we take it to be true that if your words were worth the expenditure of "considerable labour" in the making, they are worth a little in the mending; and we put it to your sense of honour, as the Astronomer Royal in the service of the people of England, and, as a scientific man, in the very zenith of your fame, whether you will stand this blow, and, in sheer weakness, suffer us to strike the other cheek, or whether you will attend to the call of a host of anxious minds and *accept the challenge* which we have given you, prove *us* to be fools and dull of comprehension if it be in your power, confirm your statements if you be able, maintain your dignity, and wipe off the unbecoming stain which is now seen upon the face of your *Lectures*, and thus save your name from becoming a bye-word amongst the millions who will follow on in the bright steps of astronomical science under the guiding star of TRUTH.

MAN'S BEST FOOD.

A REPLY to a Work by Dr. E. LANKESTER, F.R.S., "On Food."

By "COMMON SENSE."

Publisher,—J. BURNS, No. 1, WELLINGTON ROAD, CAMBERWELL.

Price Sixpence.—With Illustrations.

THE EARTH NOT A GLOBE.

By "COMMON SENSE."

THIS Pamphlet is intended to be an Introduction to the subject of which it treats; and to awaken in the mind of the general reader a conviction of the unsoundness of the modern theory of Astronomy, as well as a desire to know the Truth. Price 1d.

In Sixpenny Parts.—Published occasionally.

Theoretical Astronomy Examined and Exposed.

By "COMMON SENSE."

CONTENTS OF PART I.

The "Exact" Science of Astronomy... Sun's Distance varied from three-and-a-half Millions to a hundred and four Millions of Miles! ... The Velocity of Light... The Daily Telegraph and the Greenwich Astronomer..... Astronomers' "Corrections"..... Rev. C. Pritchard's advice ... Sound versus Sense..... Mr. Hind's version,—122,000,000 of Miles cut off Neptune's Distance, at one stroke!... "Parallax" ... Rev. R. Main's "Proofs" ... Suppositions... Dr. Lardner and the "Planet" Dr. Lardner's Concave Convexity!... Mr. Glaisher's Balloon "Observation" a flat Contradiction ... R. Burchett, Esq. on the View from a Balloon, &c.... Lord Brougham and Sir D. Brewster ... Rev. D. Olmsted :—his ingenuity!... The "Spherical Loadstone" ... Supposition and Delusion.

CONTENTS OF PART II.

Galbraith and Haughton's Manual ... What is Theory?... The one thing needful :—simple and direct proof... Figure of THE EARTH... The Horizontal Line ... Arguments are useless when based on assumptions..... The Traveller and his money..... Belief versus Knowledge... Dr. Mann... His "Large Round Ball!"... Rev. J. G. Wood... The Boundary of the Sensible Horizon on a Level Plain... Extraordinary Navigation... Reasoning in a Circle... The Fly on the Orange..... Dr. Mann's argument upset... Is there no distinction between "level" and "convex?" ... Mr. Willard... His "Proof" shown to be no Proof—like all the rest Mr. Glaisher's "Observation" Corrected and Remodelled in the Leisure Hour... M. Fontenelle on Hypothesis.....&c.

CONTENTS OF PART III.

The 'onus probandi' on the Astronomers' shoulders..... Is water level, or is it not? Webster's Propositions examined ... What a level surface really is ... An observation by Mr. W. T. Lynn, of Greenwich Observatory..... Ponds, Lakes, and Oceans level..... The "True" and the "Apparent" level of Astronomers..... What is a spherical level?... Its absurdity... Joyce's Scientific Dialogues ... The Reverend gentleman says, the true level is not a straight line, but a curve!... The allowance said to be made by Surveyors... The Cat let out of the Bag... Surveyors' Back and Fore-sight ... A Delusion or a Cheat... The surface of the Earth all top... The new Brass Plate in the wall of Greenwich Observatory ... The STANDING ORDER... One more so-called PROOF of Rotundity gone... Excelsior!

CONTENTS OF PART IV.

Sir John Herschel takes the Copernican system "for granted"... A bold step : but proved to be a wrong one... "Iconoclast" and Mr. Woodman ... Travelling "more than a hundred thousand miles" in a few minutes! ... An Astronomical Joke... M. Arago and his want of confidence in his own senses "As the Old Cock crows, the Young Cock learns"—The Tailor and his Coat... Sir John Herschel's "Thread" and "Pearls"... The First Step in the Wrong Road ... An Earthly Body said to be the Chief of the Heavenly Ones! ... Astronomical Arguments, Schemes, Tricks, and Conclusions..... Mr. Glaisher once more ... Sir John Herschel himself testifies that Astronomy is founded on Imagination... Truth must out sometimes... A Word of Advice, &c.

CONTENTS OF PART V.

Sir Richard Phillips, and Newton's "execrable superstitions"... Further Examination of Sir John Herschel's celebrated Treatise ... "False and Fanciful Theories" Illustrated... Bradley's Geometry ... The "invisible" and the "imaginary"... Land is in the Water... What St. Peter says is scientifically correct... Sir John's Conclusion with a New Face upon it... 'What next, and next?... 'Exeter Hall Lecture' on Balloon Experiments ... Sir John Herschel and his "spherical slice"... A little bit of Good Management... The Hay-makers on the Coast of France..... Sir John and his "DATA"..... The Complicated Problem... Sir John and his Arithmetic... His "round" numbers ... Sir John's "rough" result!... The Book of Nature and its Teachings... The Shilling Magazine,—&c.

PUBLISHED BY

JOB CAUDWELL, 335, STRAND, LONDON.

William Carpenter, Printer, Greenwich.

THEORETICAL ASTRONOMY

EXAMINED AND EXPOSED:

By "COMMON SENSE."

A MOST ASTONISHING DISCOVERY!!

At a Meeting of the Royal Astronomical Society, April 13, 1866, the Astronomer Royal read a Paper on certain "supposed possible effects," one part of the subject "embracing the solution" of problems "which could hardly be solved." So says the Astronomical Register; and it continues as follows:—"The Astronomer Royal had, however, pursued the subject, and at length discovered two terms which appear to exercise an influence on the rotation of the earth. One effect was clearly microscopic; and the other, although it might be palpable, still Mr. Airy thought that, looking to the imaginary state of things on which only the subject could be treated, and the difference of an equatorial canal from the real ocean with the great Continents of America and Africa running down into the waters, the result could be of very little use as a guide in the real state of the case, and would probably go for nothing."—Astronomical Register, May, 1866.

CONTENTS.

Anticipation ... How far distant is "excessively" distant? ... The Thin End of the Wedge! One Hundred and Ninety Millions of Miles in Six Months...The Telescope and the Plumb-line once more... "Turnip-shaped" Predictions, and "Turnip-shaped" Verifications... The Travellers' Debate... Spherical and Spheroidal ... A Straight Line ... The Astronomers' "Arc." ... How we travel East or West, North or South... Professor Airy's "Why" and "Because." ... The Pedestrian... The Rule of Three Question ... Professor Airy's "Charge." ... Only a "Notion!" ... Driving Astronomers helter-skelter ... "PARALLAX." ... Sundry Objections... "Tumbling Over!" ... The Balloon, and the Lads of the Village... "Throwing Dust" in One's Eyes... "Foretelling" Explained ... M. Foucault and the Pendulum Experiment ... Mr. Bird's Suggestion What Mr. Reddie Believes—and What he Doesn't! ... Mr. Dunkin and his Millions! ... Young Hopeful, the Astronomer, and the Philosopher... Recapitulation ... Where are we now? ... The Ocean TRUTH... Dr. Dick's Chain Thrown Overboard! ... Determination ... Upward! Onward! ... Reason's Flaunting Flag... End of Chapter VII.

LONDON:

JOB CAUDWELL, 335, STRAND, W.C.

CHAPTER VII.

PERHAPS no other science besides *Theoretical Astronomy* can, with truth, be called a science of *anticipation*. Its professors anticipate the beginning and the ending; and, throughout the whole of its course, from first to last, it lives and grows on *anticipations*. Unlike its elder sister, *Practical Astronomy*, whose meat and drink is *observation* and whose destiny is to the end of time, *Theoretical Astronomy*, worn and wan with its struggle for existence, is scarcely pleasing to look upon. Professor Airy, in his *Ipswich Lectures*, even so soon as in the third paragraph in relation to the subject in hand, speaks of "the globe." This "globe" is, however, not a *terrestrial* but a *celestial* one; and the Professor is telling us whereabouts on this manufactured globe to look for a particular star. Here, then, whilst the subject is even in its swaddling clothes, we find, presented to the mind and the hand of the learner, ideas and terms and instruments which are confessedly brought into use without foundation, and which become established in the mind as being veritable representations of things in nature *long before a thought is given as to their truth or fallacy*. The consequence is, familiarity puts suspicion out of the question; and, it becomes next to an impossibility to convince people of the mistake into which they have been led, even if one gives his heart and soul to the business. What matters it, then, to the ordinary reader, when he comes to such words as these, which we find in page 78?—"Now our use of the celestial globe or sphere is founded on the "assumption, that it is a representation of the Heavens, on the supposition that the eye of the observer is at the centre of the sphere." It would signify but little if "assumptions" and "suppositions" overlaid the case by the dozen, if the thing be valued through mere familiarity. But, when we are able to see the small end of the wedge in the shaky hand of *Theoretical Astronomy*, is it not enough to make us think that we can discern something ominous? If we turn to page 72 of the volume before us, we shall find that the small end of an enormous lever is inserted into the case of the Zenith Sector with its moveable telescope and its common plumb-line. We read as follows:—"Inasmuch, therefore, as the telescope, from being directed to the same star, which is "excessively distant, takes the same direction in different places; and "inasmuch as the plumb-line takes different directions in different "places; by means of these we get the variable positions of the plumb-line referred to the invariable position of the telescope." Here we find a fresh element of the greatest bearing on the subject introduced to the reader's notice in such a manner that, if he be not very careful, it will escape his notice altogether, and, at last, through being common-place, will sink into a contemptible, insignificant thing. As though it *might*, however, strike someone as being *rather* strange that a telescope should

be *in the same position* when pointed at one star from two places on the same meridian, the star is now just said (as though in passing) to be "excessively distant;" and we are left to imagine (if we please), or not, whether this *excessive* distance may or may not be the *cause* of this very singular affair! Why, the fact is, by and by, this star, which is here just said to be "excessively distant," will be spoken of as being *millions of millions of miles* away from us, at the very least; and we shall hear it spoken of as being the *cause* without any question at all about it "*why*" the strange thing in question is to be considered to be a reality. Indeed, we shall hear, by and by (when we shall have become quite used to the thin end of the wedge), that the stars we look at so easily are *infinitely* distant: so distant that *though the earth carry us along with it in its orbit in six months a distance of a hundred and ninety millions of miles through space, THIS distance is as a mere speck compared to the distance of the nearest star, and does not alter its position in relation to us!!* All this comes by and by. "Excessively distant!" As though this gave us the smallest piece of information! Why, Mr. Glaisher could with more correctness of speech have been said to be "excessively" distant when he went out of his way and risked his life perhaps six miles above the earth in Mr. Coxwell's balloon. But this is not all. What does Professor Airy mean by the sentence we have taken from page 72, if it be considered as to its main point? Just this:—*Inasmuch as the telescope takes the SAME direction at different places, and the plumb-line takes DIFFERENT directions at different places, "we get" the VARIABLE directions of the plumb-line, and the INVARIABLE direction of the telescope!* Now; this is almost too much to tell us at one time! But, being the most indispensable thing—for the sake of Theoretical Astronomy—in the whole book, we must not blame Professor Airy for trying to make it *appear* to be *true*, at all events; and, for the very same reason, he cannot, surely, blame us for looking at it closely and making it comprehensible. Well, then, to render it perfectly clear, it may be put in *this* form:—*Inasmuch as A is B, and B is A, "we get" A for B, and B for A.* But, unfortunately for the Professor's argument, the placing of it in this light exposes its real nature and enables us to see through it: for, *inasmuch as A is not B, and B is not A, Professor Airy does not "get" A for B, nor B for A.* Professor Airy's words, if remodelled to harmonize with the facts, would stand thus:—"Inasmuch, therefore, as the telescope," through being "directed to the same star" from different parts of the earth's surface on the same meridian, has necessarily *GIVEN* TO IT *different* directions in these places; "and, inasmuch as the plumb-line" "*TAKES*" the same direction "in different places;" "*we get*"—that is, if Professor Airy will have the thing made stronger by adding mere words unto it—"we get" the *INVARIABLE* position of the plumb-line, to which we may, if we think fit, "*refer*" the *VARIABLE* positions of the telescope. 'Well, but,' it may be said, 'this is making black, *white*!' Of course it is: and it makes white appear *black*, too—very black, indeed. But we must not mince the truth to save a little labour on the part of even our best friends: and why should not astronomers ruminate just as they have set the world ruminating! But, the star has been said to be "*excessively* distant!" Well, for the present, at all

events, we shall decline *anticipation* on this point, and reject *the thin end of the wedge!*

Professor Airy, then, *imagines*, we may conclude, that he "gets," by the means he has made use of, *a globe!* Well, does it satisfy him? O, no: how is it possible that it should? The Professor tells us of the various expeditions which have been conducted at the expense of different Governments to ascertain the figure of the earth: he speaks of two expeditions, under the auspices of the French Government, one to Lapland, and the other to Peru; and he says, "No two expeditions ever rendered themselves more justly celebrated than these." And he tells us how that, in these expeditions, the Zenith Sector was used—the Zenith Sector with its *moveable* telescope and its common plumb-line. He tells us, "in Lapland they had to go $69\frac{1}{2}$ miles, or something like that, in order "that the directions of the verticals should change one degree," and, "in Peru," "only 69 miles." And he tells us how that, in consequence of all this, the earth was first supposed to be oval and then to be neither oval nor spherical but "spheroidal,"—neither egg-shaped nor ball-shaped but turnip-shaped. He tells us how that Sir Isaac Newton "predicted that the earth would be ascertained" to be "turnip-shaped;" that "the rule which theory gave was, that the earth would be" turnip-shaped; and that, at last, "the supposition that the earth is" turnip-shaped was positively adopted. And he tells us that it is found that a line cut through this turnip-shaped earth in one direction is 39,800 *feet* less than one cut through it in an opposite direction! But we are told by the greater number of astronomers that 26 *miles*—nearly four times the amount given by the Professor—is the difference between these two lines, or, between the longer and the shorter axis of the earth! What is the consequence? Why, the major question is lost sight of in considering a minor one: like a traveller debating as to which side of the road he shall walk, and losing sight of the fact that he is on the wrong road altogether. The astronomers forget that they have not yet proved the earth to be anything like unto a globe, but they take up the attention of the world at large by their discussions as to whether the earth be spherical or spheroidal! Sir John Herschel says, in section 163, in his *Treatise on Astronomy*, when speaking of a spheroidal body, "If a model of such proportions were turned in wood, and laid before "us on a table, the nicest eye or hand would not detect the flattening." Well then, Professor Airy continues the subject of the measurement of the earth, not to learn if it be round or *not* round, but, as to whether it be spherical or spheroidal; and, in bidding 'Farewell' to the business of the Zenith Sector, the Professor makes a grand demonstration: and we find the *subjunctive* mood displaced by the *indicative* one. It is no longer "If the earth *be* curved," but, in all boldness, in page 53, these words appear:—"In England, the arc from the Isle of Wight to the "Shetland Islands," "has been measured. In India, an arc extending "from Cape Comorin to the neighbourhood of the Himalaya mountains has been measured under the direction of the East India Company. In "Russia, the measurement of an arc is going on at the present time, "extending from the mouth of the Danube to the North Cape." But, to call that an "arc" which is nothing more than a straight line, is just

—doing what? Making a *mistake*, if it be nothing else. If the spoke of a wheel be an *arc*, then is the line from Shanklin to Balta an “*arc* :” but what, then, should we call the wheel’s tyre? If a walk from St. Paul’s direct to a place in the environs of London be in the direction of an *arc* of a circle, then shall a survey of the earth’s surface in a direct north and south line *wherever we please* be in the direction of an “*arc* :” but we should have to *find* a name for a walk round St. Paul’s at any distance from it! But the thing is a mistake: this being, perhaps, the most gentle and fitting term to give it, since ‘the least that is said is the soonest mended.’ The *meridians* on the earth’s surface are nothing more than imaginary *radii* extending from a point where the North Star is immediately over-head, or, “in the Zenith,” to the very *ends* of the earth in every direction: each *radius* or *meridian* diverging from the centre, the *North*, to a point, in the circumference, which will be the *South*: and, therefore, every meridian is a straight line and *not* an *arc*. But, if we travel *round* the north point in a direct circle, we shall then be continually going to the *East* if we journey with the north point on the left hand; and we should be continually going towards the *West* if we travel with the north point on our *right* hand. ‘Well, but,’ it may be said, ‘we can travel (perhaps) to the *North* point, and we may arrive ‘at a number of places which may be said to be *in the South*, but to get ‘to a place that may be *truly* said to be *East* or *West* would be impossible.’ True: just as we speak of *yesterday*, *TO-DAY*, and *to-morrow*. “*To-day*” is: but “*yesterday*” is past; and, though we are continually travelling towards “the *tomorrow*,” we can never say ‘Here it is!’ *East* and *West*, then, are *relative* terms, like *yesterday* and *to-morrow*. Now then: to travel over the earth’s surface westerly, or, *towards the West*, would be to travel in an “*arc*,” as a matter of course; and it would be to travel round as do the hands of a watch over its face; and, just as we should never expect one of the hands of a watch to be over any two of the sets of figures at the same moment, so no reasonable man (we should think) would ever expect any given star, as it travels in its westerly course, to appear over any two points on the earth’s surface—or to cross two meridians, or, two lines running directly north and south—at the *same moment of time*! If we turn to the volume before us, Professor Airy’s *Ipswich Lectures*, in page 54 we shall find something which will be said, at once, to be remarkable, say the very least of it. The Astronomer Royal says, “Suppose we place a transit instrument at Greenwich, and “observe the time when a star passes the meridian. Suppose we place “a transit instrument on the Coast of Ireland, and observe the time “when the same star passes the meridian there. It will be found that “they do not pass at the same time. Why?” Now, Working men:—you to whom the *Lectures* were delivered:—Would you imagine that the question “Why?” would ever have been asked? Hear, then, the answer which follows immediately:—“Because the earth is *curved*.” “*Because the earth is curved!*” Surely this answer must surprise you more than did the question. It would have been just as pertinent if the Professor had said, ‘*Because the earth is flat!*’ Flatness or curvature has nothing whatever to do with the matter: it is only a question of *time*! If the face of a watch were curved, and the hands bent, it would

make no difference in the *time* that must *necessarily* elapse in the movement of the hands *from* the figures which indicate one hour to those which indicate the next. Well then, so far as the passing of a star over the meridian of a given place is concerned, it is clear that *it may be* quite independent of anything like "curvature" in the sense in which a *globe* is said to be curved; and it must be perfectly clear that, *until the earth shall have been PROVED TO BE curved*, it *IS* nothing short of downright *anticipation* to bring it in as a '*Reason Why!*'

Professor Airy, in continuing this subject, gives us the following piece of information. He says:—"By observing transits of the star "with the clock at one place K, and by observing transits of the same "star with the clock at the other place L, and comparing the clocks, "we have the means of ascertaining the absolute difference of time of "transit; and when we have done that, we can tell how great a fraction "of the revolution of the earth has been performed." What can we say to this? There is really no chance of being able to reply to a thing of no sense: all that can be done is, to make the nonsense apparent—to pull off the tissue paper, and expose the article. Here, then, it is quite plain that the Professor pays no attention whatever to the meaning of the word "*transit*," which is, certainly, as decisive a word as we can find in the English language. How can a thing be *transitive* and yet be *fixed*? How can a transit instrument be used to ascertain *the time in which* things move, if they do *not* move? And, if the instrument is to indicate *their* motion, how is it to be supposed that, instead of serving this purpose, it should serve another one altogether? In fact, how can any one in his right senses imagine that the finding out of how rapidly the star moves will be to him a means of 'telling' how much *the earth* has moved! As well might we say that, if we knew the times at which a pedestrian arrive at any two places in a walk round London, we could tell how much the ground had moved under his feet!

Professor Airy now gives us a diagram in which the line PL is to be supposed to represent a meridian, and S, a star in the distance; and we read as follows:—"It makes no difference whether we suppose the earth "to turn round so as to bring the plane of PL to pass through S, or "suppose the star to turn round the earth, so as to make S pass through "the plane of PL; the result is just the same." Well, then: if we do as the Professor himself has elsewhere suggested, namely, "apply this *reasoning* to ordinary sublunary phenomena," it makes no difference whether we *suppose* the pedestrian has walked a part of the way round London, or whether we *suppose* that London has shifted round under the pedestrian! Certainly not: but the man who would *suppose* any such thing as this, would in his turn be *supposed* to be somewhat out of his mind. Working men! it is in page 55 that Professor Airy, your Astronomer Royal, talks in this way about *supposing*!

"Now," says Professor Airy, "the problem becomes this. If in 41 "minutes 23 seconds so many miles pass under the meridian of the star, "how many miles will pass under the meridian in 24 hours?" This simple "Rule of Three" question, we are informed, will lead us to know the whole distance round the earth at the place in point. Well, then, since astronomers do not seem to be very particular as to the nature of

their suppositions, and since all seems to be well that *ends* well, we will have the Rule of Three question stated in our own way, as being much less likely to lead to confusion and discomfiture. Instead, then, of saying, If sixpence costs a pound of sugar, how much sugar will twenty-four sixpences cost, we will say, If a pound of sugar cost *sixpence*, how much *money* will twenty-four pounds of *sugar* cost? Instead of saying, If London *shifts* round under the pedestrian's feet four miles in one hour, how many miles will shift under him in twenty-four? we will just be innocent enough to put it as though we really *supposed* that it was the pedestrian that moved, and that London *did not*! And, in perfect conformity with the peculiar state of mind indicated by the foregoing method of putting a proposition—a state of mind which psychologists and metaphysicians and other curious sorts of people would look upon as being tolerably sound,—instead of entertaining Professor Airy's very learned proposition of the earth going round under the stars, we certainly will, if it make no difference with the Astronomer Royal, put it in our own unsophisticated, *matter-of-fact* style, and simply ask, If, in 41 minutes, a star pass over *so many miles*, how many miles will it travel over in twenty-four hours? Now, if any little boy know *how many miles* he shall put down for "*so many*," of course he will be able to find out the answer: and we may then assure Professor Airy, in his own words, that "the result is *just* the same!"

It is not long since we spoke of Professor Airy bidding 'Farewell' to the Zenith Sector—the Zenith Sector with its *moveable* telescope and its common plumb-line. - True: but, this leave-taking is like the lovers', inasmuch as it lasts a long time while it *is* about, and is often repeated. In page 106, we read as follows:—"In regard to the use of the Zenith Sector, of which I have spoken so frequently, I should wish you to charge your memory with this one notion. When that instrument is used for determining the measure of a degree of the earth, by being transported to two different stations, as A and B, Figure 18, and by being employed for observing the same chosen star at both places, the direction of the telescope is really the same at the two places, but the direction of the plumb-line is different at the two places. But, if we consider it only as a matter of observation at each of the places, then we fancy that the direction of the plumb-line is apparently the same in the two places, and that the direction of the telescope is apparently different. Thus the direction of the telescope, when pointed to the same star, is apparently different at Shanklin from what it is at Balta; but, in point of fact, the direction of the telescope is the same at both, and the direction of the plumb-line or the direction in which a stone would fall is different at the two places." Over and over again do we find words like these, for the purpose of making us *believe* that the earth is what is commonly called a *globe*. Over and over again is it necessary to assert that the belief is a *false* belief, since there are so many people whom a Professor is able to overcome by the force of mere words. But let *anyone* possessing a little common shrewdness look at this grand argument for a moment, and it will wither and die from shame. "In point of fact," as the Professor himself says, it is a "*notion*!" Would it not be better to give us a "*notion*" that the thing might be a *fact*?

Is it possible that Professor Airy could have had the smallest idea that the thing was a reality, and yet call it a *notion*? But it is a "*notion*!" "I should wish you to charge your memory with *this one notion*," says Professor Airy. 'Just take *this one pill*!' says the fond mother. Alas! the child knows that it is not the *only pill in the box*! Let Working men but take this *notion* and there will be plenty more to follow. But at all events a "*notion*" it is: and *some notions* there are which are not to be laughed at. Let us examine this one. Be it sugar-coated or sugar all through, we will analyze it at once. This much we *know* concerning the Zenith Sector with its moveable telescope and its common plumb-line:—*Either the telescope or the plumb-line* becomes altered in its position when the instrument is used at the two places, A or B—at Shanklin or Balta. Since *both* of them *do not* become thus altered, we need only take *the telescope* in hand, and leave *the plumb-line* to hang as it lists: for, if the *telescope* be altered, it will be the *plumb-line* which maintains its parallelism in the two places—and *the earth is flat*; on the other hand, if the *plumb-line* should alter its position, it would be the *telescope* that maintains it—and *the earth is not flat*. Professor Airy, then, gains *his point*, if he prove that the telescope maintains its position at the two places. Now, if we carefully pick out all that we find concerning *the telescope*, in the paragraph before us, it will stand as follows:—"The direction of the telescope is really the same at the two places. But, on observation, we fancy that the direction of the telescope is apparently different. Thus the direction of the telescope is apparently different at the one place from what it is at the other; but, in point of fact, the direction of the telescope is the same in both." As we now have the words of our Astronomer Royal before us, it is evident that they approach somewhat nearer to the level of the common, every-day mind! There is still, however, an unnecessary element in them: since none but the well-trained astronomer could ever *fancy* that a thing was *apparently* in some peculiar direction after he had used his senses in the *observation* of it! No: ordinary people act in an ordinary manner, and speak only ordinary language: what they *see* is devoid of *fancy*, and what they *know* they *tell* you, if they set about it. Casting away, then, all extraneous matter from this astronomical proposition, it stands thus:—"The direction of the telescope is the same in the two places, although it is *apparently different*." Does Professor Airy gain *his point*, then? O, no, indeed! If assertion oft repeated make a thing *true*, and *prove* it, as many people seem to imagine, *then* may the Professor be said to have gained his point repeatedly. But things of this sort are not managed so quickly. Over and over again do we find the assertion; the Professor *not once* essays to prove it! No! the thing is *impossible*, though the astronomers try till doomsday. This is what Professor Airy *should* have said about the Zenith Sector:—"It is an instrument by means of which we attempt to prove the sphericity of the earth, *but* by means of which we prove just what we intended to disprove, namely, that the earth is—take it altogether—a level, extended, PLANE. For, inasmuch as *no variation* has ever been detected in the direction of a plumb-line suspended at any part of the earth's surface; and, inasmuch as, by all the powers of *observation* we can summon to our aid, the telescope must

'be acknowledged to have *its* position altered *just as we are compelled to alter it* as the star apparently sinks or as it alters its position in relation to us; so this instrument *fails* as an instrument to suit *our* purpose, and turns out to be a weapon which we ourselves have placed in the hands of our opponents calculated to produce only mortification and dismay 'in our stately ranks.' So much, then, for the Zenith Sector with its *moveable* telescope and its common plumb-line!

And where are we *now*? we are inclined to ask, after all this roaming amidst the brakes and briars of Theoretical Astronomy. And, 'Where are we now?' we are inclined to think, some astronomers will inquire! Working, Thinking Men! If you have travelled with us all along, *you* know where we are. *You* know that we have undermined *Theoretical* Astronomy so completely that it is virtually fallen, and we are standing amidst its ruins. *You* know perfectly well, by this time, that the Earth is NOT A GLOBE, but a LEVEL, EXTENDED PLANE! If, indeed, *you* be not satisfied of this fact, it is very doubtful if ever it were possible to convince you of the error of anything you may once have been led to believe. Many persons there are whose minds are so constituted that it seems as though they could not be shifted from the groove which has been cut out for them: and it is not worth the while to try. But *they* are not the men likely to be alongside of *us*! O, no: float down the stream—keep in the beaten track—*these* seem to be the sentiments, at present, somewhat largely entertained,—but by *them*, not by *you*. If they hear not, they strike; and, if they reason not, they ridicule. But *you* are their masters. You have now the means at your disposal to send the blood into their cheeks as with an electric shock. Heed not a host of mathematical demonstrations with which clever people will try to bewilder you. Insist upon it that *one step be proved before another be taken*; and you will drive the whole body of *theoretical* astronomers helter-skelter before you! Remember that the putting of some knotty question to you does not lower you a single peg, except in the estimation of some unthinking bystander who sees, perhaps, that you have not an answer already stereotyped which you can forcibly hurl at the teeth of your antagonist. Remember, likewise, that ten thousand times more questions can be put to *any* man than those he shall be able to answer; and that a very prolific source of error is the belief that Professors in general are perfectly able to answer *any* question upon *any* subject that may be presented to them. Be not put down, then. If you see clearly all that we have brought before you, you need fear no astronomer's argument. You will be told that an eclipse of the moon is a "proof" of the earth's rotundity, 'because' say the astronomers, 'the shadow of the earth it is which hides it.' *It is no such thing!* Astronomers are quick and ready, like the bats, to fly for refuge into a "shadow," as it is called, and are content to ignore the substance. When they prove the nature of the *substance* which is under their feet, *then, and not till then*, will they be in a position to say a little about the possibility of the *shadow* falling on the moon! But this is used as a forlorn hope: and it may be that some persons get dumbfounded by means of it. Let this not intimidate you. Astronomers themselves speak of non-luminous bodies in the heavens; and they tell us, also, that an eclipse is produced

by the intervention of a "body" between us and the object eclipsed. If this be not sufficient to explain an eclipse of the moon, even as well as we explain that of the sun by *the moon's* body intervening, certain it is that it requires but little else to do so, and no stretching of the imagination at all. And, if this *is* the truth, remember that to "PARALLAX" is due the thanks of those who accept it as being so. Professor Airy is too wise to attempt to throw out any *shadowy* hints concerning the earth's roundity: believing, possibly, that the Zenith Sector is the one thing needful. Again: you will be told that, if the earth is flat, we might go to the edge and *tumble over!* This is said by people who know all about these things without ever having given them a thought. But, if they *should ask* you concerning this matter, be not at a loss. Remember, if you hear this conjecture spoken of, it arises from the fact that he who mentions it is not off with the old love though he is on with the new,—he has not cleared his mind of the "notion" that there is *space below* as well as space above—or, indeed, that the earth must be suspended in the heavens whether it be *flat* or round. *This is not the fact, so far as we know.* What we know about the matter is this:—If we travel to the North, we know there is no 'tumbling over' *there*, as it is the centre of all the land or water that man has ever explored; if we travel *East* or *West*, we go *round* the centre; and, if we travel to the *South*, we travel to the *circumference*. *Here*, then, is the only locality where any fear of 'tumbling over' can be entertained for a moment! What is the *fact*? As voyagers push their course as far as possible in this direction—very far beyond all known land,—what stops them? Mountains of Ice! All ideas of 'tumbling over,' then, have vanished. Far beyond the influence of the Sun's rays, this dreary region can be pictured in the mind, without a journey thither! As the circle made by the Sun in his daily course is towards the South in relation to an observer having the North Star not far from his Zenith, so the circle made by the Sun at the best of times in *this* dreary region is towards the North, in relation to the wanderer about the Southern Icebergs: in the first instance, the Sun in his daily circuit *includes* the observer; in the second, the wanderer is *excluded*—he is outside the genial circle, and *almost* beyond its influence. '*So far canst thou go, and no farther!*' seems to be engraven on the icy barriers: hence the limit of man's knowledge in this particular direction. But, the '*tumbling over*' objection certainly falls to the ground. Again: it will be said, in the words of Mr. BAIN, in *Chambers's Educational Course*, "If the earth were a boundless flat level, our view "of the heavens from it would be the same wherever we went." This objection is but an old one in a new dress. The earth *is proved to be level*, and a view of the heavens *is known to be* different wherever we go. This is a sufficient answer. But, moreover, it must be said that anyone with an ordinary stock of intelligence, if he give the matter a moment's consideration, will see the absurdity of the objection. If we imagine, for example, a balloon retained in one position in the air, over some plot of land *known to be perfectly level*, at the height of thirty or forty yards, a view of this balloon as seen by a spectator a hundred yards away would be very different from a view of it at fifty yards. It would appear to be lower, of course. Again: how often may we see half the

little boys of a village, and some of the big ones to boot, racing at full speed at the cry of 'Bal-loon!' What for? Why, the thing has been drifted to a greater distance from them, and they imagine that it is fast falling to the ground—it seems so low! Ask these little boys, when they come back, if their view of the balloon was "the same wherever they went!" See if they be not almost as much ashamed to tell you how they were taken-in as we are to have to be compelled to reply to such objections as those brought forward by Mr. Bain, the astronomer. But perhaps the most common objection is the following one:—"If the 'astronomers' theory were wrong, *they* could not foretell the time when 'eclipses will take place, or when the moon and the planets will pass the 'meridian.' Now, should this one be urged—and objections will come up as thickly, and appear as dazzling, as poppies in a corn-field,—just refer to the words of Dr. Lardner, in his *Museum of Science*. He says, "All the diurnal changes of appearance presented by the firmament, "the risings and settings of the sun, moon, and stars, and their varying "appearance in different latitudes, admit of being explained with equal "precision and completeness, either by supposing the universe to revolve "daily round the earth, or the earth to revolve daily on its axis." If we refer to a pamphlet written by James Smith, Esq., Chairman of the Liverpool Local Marine Board, &c., on the subject of the Quadrature of the Circle, we shall find extracts from a communication which Mr. Smith received from a friend—"an Astronomer as well as a Mathematician." Here are a few words. "It is well known that from the Newtonian "system—and I may say from any other system whatever, hitherto "made use of—the moon's time of southing cannot be, and is not, nor "ever has been foretold. It is from the mere empirical system, the "system of observations only, that the time of the moon's southing is "known." "The fact is, that astronomers" "are used to throw dust in "the eyes of the public, and to lead ignorant readers to believe that the "Mathematicians are almost divine. But they are not." So far, then, as the matter of *foretelling* goes, *observation* takes a larger share of the business than is commonly supposed, and *mathematical calculations* a great deal less. It is, indeed, the province of *Practical*, not *Theoretical*, Astronomy. If we turn to a volume by the Rev. H. Moseley, M. A., entitled *Lectures on Astronomy*, we shall find these words, introduced by the Reverend Astronomer when speaking of the moon's appearances:—"By a very remarkable coincidence, at the *end* of the nineteenth year, "her longitude will be precisely the same as it was at the commencement "of the cycle. Thus describing nearly the same path in the heavens, "and having the same longitude, or being at the same point in that "path, she must occupy very nearly the exact place in the heavens which "she did nineteen years before: the sun, moreover, occupies the same "place. *Whatever relative positions they had then, they must, therefore, "have now: and if there was an eclipse then, the same eclipse must occur "now.*" Hence, the objection that the astronomers could not *foretell* eclipses if the accredited *theory* is false, is proved to be of no weight or value whatever. Again: M. Foucault's Pendulum Experiment will be brought forward as a "proof" of the earth's rotation! A more absurd experiment it is scarcely possible to imagine. Dr. Lardner says, "This

"contrivance is based upon the principle that the direction of the plane of vibration of a pendulum is not affected by any motion of translation which may be given to its point of suspension." 'Well then,' say the astronomers, 'suspend a pendulum, as did M. Foucault, in 1854, at the Pantheon at Paris, from the dome of any large building, and let there be a round table covered with sand placed under the pendulum: then, as the point of the pendulum-bob strikes various diameters across the sanded table, will it be shown that the earth has rotated and carried the table round with it!' Mr. Alfred Bird, in writing to the Editor of the *Astronomical Register*, in August, 1864, says, "I have often thought if the authorities would allow the experiment to be tried under the dome of St. Paul's Cathedral, what a magnificent sight it would be to see the ball rushing along its superb curve 200 feet long"—and so on. Why, the fact is, the experiment has been tried over and over again, at various places; and, from what may be gleaned by those who have not had the pleasure of seeing the thing done, it appears that there is as much chance of its proving that the earth goes round one way as that it goes round the other—as much chance that it upset the theory as that it substantiate it! Astronomers tell us that, when the thing is done in its proper style, the plane of vibration of the pendulum will appear to move from right to left, and that "it must be inferred" from this that the earth and, of course, the building and table and all have had a movement of rotation from left to right, just as they ought to have, and that the pendulum has been swinging all the time one way! Ordinary people would say it was the pendulum that shifted its direction of vibration: but what can they know about it! Well then, the pendulum must behave itself properly, and go the right way round if it be never so slowly, or the poor astronomers will be decidedly maltreated. But the pendulums, like the people, seem as though sometimes they had a will of their own: they strike out a path which was never expected, and maintain it, too, in utter defiance of the wishes of the most august body of astronomers that ever congregated for the most special purpose. Now, Mr. Bird: Could you find a dozen astronomers willing to "rush in" and try such an experiment as this, of which angels would be shy? O, no! Just imagine—for it cannot be described—"what a magnificent sight it would be to see the ball rushing"—the wrong way! Thinking Men: just put this so-called "proof" of the earth's rotation down as being worth less than the sand upon the table, except it be to show what the astronomers would do to prove "rotation" if they really thought they could. And again: it will be said, 'Astronomers must know better about these things than other people do, since they have studied them, in many cases, for nearly the whole of their lives.' Well then, let Marmaduke B. Sampson reply. He says, in his work entitled *Truths and their Reception in relation to Homœopathy*, as follows:—

"We have those who have not only been strictly educated on a given subject, but who have also adopted it professionally—that is to say, as a means of livelihood. Now, upon this class, what must be the first effect of a new discovery, tending to correct existing errors in the system they have learned? In the first place, they must be prepared to recognise that some of the views impressed upon them by teachers whom they looked upon as almost infallible were either wholly dark or mistaken: secondly, they must give up any theories of their own which they may have raised upon the foundations thus raised in their minds, and acknowledge that new men have opened up to them a truth

which all their previous education, study, and practice had failed to set before them; and next, they must be prepared to admit that the mode of practice in which, by their peculiar skill, they may have hitherto attained reputation and fortune, must be abandoned, or modified in a way which will involve the necessity for new study, and the adoption of which must place, at least for a time, those worldly profits in jeopardy, which were previously considered secure beyond the possibility of disturbance. Will it not be admitted, that a more terrible demand upon the qualities most rare in the human mind—those of teachableness, humility, and self-denial—can scarcely be conceived; and shall we not, consequently, recognize that, apart from a reference to recorded instances, the mere process of unaided reason is sufficient to demonstrate to us, that the severest opposition to all new truths must always come from those whose knowledge, pursuits, and interests have all been mixed up with the studies to which these truths respectively have reference?"

And once more: it will be said, 'The stars being at an infinite distance 'from us, it is absurd to suppose that they travel round the earth—a 'mere speck in the universe,—we must therefore travel round amongst 'them.' To which it must be replied:—Where is the mortal who can seriously imagine that *he* is acquainted with anything compared with which this earth would be as a "speck!" Mr. J. Reddie, a most able astronomer, and a frequent contributor to the *Astronomical Register*, says, in March, 1864, "I, too, was taught, as a child, that even the earth's "whole orbit is 'only as a point,' with reference to the fixed stars; but "as a man, 'I don't believe it.'" Where, indeed, is the *finite* being who in his right mind would presume to weigh and measure *infinite* things, or believe that he is able to see through *infinite* space or calculate *infinite* distance! No: a reasoning and reflective man will see the utter absurdity of the proposition before it shall have been pointed out to him five minutes. And again: it will be said, 'What does it matter whether the earth is flat or round!' Answer, without a moment's hesitation,—'*Nothing!*' Well do we remember the taking of a friend into a small but well filled hot-house, with the thermometer up to *ninety*, whilst a hundred plants from the tropics were growing luxuriantly—many of their *leaves* as *flowers* for beauty,—and whilst he who called them *his*, and tended them, was as full of pride as was his hot-house of pots,—"Well, and what is there to look at?" If half-a-dozen cats and twice as many brickbats should, at that luckless moment, have come through the glass overhead, it would not have electrified the man of the watering-pot and thermometer more than did this question! "*What is there to look at?*" "*Nothing at all.*" How much less, then, does it signify to *some people* whether the earth be flat or round! And still once more, and once only,—for we have entered, fully, into the fact of the ships appearing sails first and hull last, and into the notion that ships sail round the earth by sailing down and up again, and into a variety of other strange fancies which have gone abroad,—so we say, finally, that, should that very common ebullition of feeling known as laughter be manifested, we have no '*reply*' to suggest; and the inward satisfaction of which the fit of laughter is but the outward and visible sign may be beneficial to him who experiences it, and cannot possibly injure anyone else.

It may now be granted, in justice to Professor Airy, that the absurd idea of *infinite* distance, as regards things which *we can see*, has been in a great measure the cause of all the mischief. An idea which is held to be something very grand and astonishing will frequently overwhelm the evidence of man's own senses. M. Arago, in *his* Lectures on Astron-

omy, gives these very words! He says, "We have now to enquire whether the annual revolution of the Sun is real, or whether this too is not an appearance caused by the earth's locomotion, for *we have learned to distrust the evidence of our senses.*" Poor, deluded mortals! one is ready to exclaim. Why, all chance of *progressing* in knowledge is absolutely done away with. Professor Airy himself says, in page 63 of the volume before us, when speaking of "the general facts deduced from our observations,"—"supposing we do not trust to them." Thus we see that it is quite possible for our clever men to run after grand or imposing ideas and leave the "*general facts*" to take care of themselves. Professor Airy seems to have been thus unfortunately led away by this kind of enthusiasm, in the matter of the Zenith Sector which has been examined so particularly. *If we believe* that the distance of the stars is *infinite and incommensurable*, we shall then believe, even in the face of the plainest evidence to the contrary, that a journey from Shanklin to Balta wont make any difference. Professor Airy is, possibly, like many other people who believe just what they have been taught and who cannot alter, fully impressed with the conviction that "*one hundred and ninety millions of miles*," the supposed diameter of the earth's orbit, has no appreciable effect upon the appearance of the stars, if these bodies be viewed first from one end of this line and then the other! how, then, is it to be imagined that he can allow anything for a paltry *eight-hundred and thirty miles*, even though every known fact urged him to do so? No: what are *general facts* when compared with a man's *belief*? It is quite possible, then, that our Astronomer Royal really *did believe* that "the place of the star," in his celebrated Shanklin observation, was "*unaltered.*" And it is morally certain that, when the Professor introduced that most weighty though obscure piece of *anticipation*, namely, that the star was "*excessively*" distant, it was no more nor less than this '*infinite*' distance of which he was thinking. If anything can be found likely to bear out this opinion, it is, perhaps, this fact:—Mr. Dunkin, one of Professor Airy's own Assistants at Greenwich Observatory, publicly stated, and repeated the statement, in the course of a Lecture delivered almost within the shadow of the Observatory itself, in the month of March, 1866, that "One of the nearest of the stars is distant *sixty billions, one hundred and seventy-nine thousand, five hundred and fifty MILLIONS of miles.*"—*One of the nearest!* This distance is confessedly beyond all the powers of *finite* comprehension: we must, therefore, say, it is *infinite*. And, considering all this, it is easy to understand that a "matter of observation" "*only*," respecting the Zenith Sector, was of no importance whatever in the mind of Professor Airy, even as he himself intimates.

But, *how is it* that "*one hundred and ninety millions of miles*" is spoken of by astronomers as making no appreciable difference in the position of the stars? Because astronomers *believe* that the earth *moves* to this extent in *six months*; and, as they find, after this lapse of time, no difference in the position of the stars in consequence, they *presume* that the *infinite distance* of these bodies is *thus* established: and it does not seem as though it crossed their minds for one moment that the real cause of the fact that there is no difference is that the earth *has remained in the same place all the while!* But we have shown that the astronomers themselves,

in their endeavours to prove the earth to be a globe, have, over and over again, by the most indisputable evidence, proved it to be a *plane*, and *not a sphere*; and, as the motion of the earth is only *presumed* to obtain in connexion with, or on account of, the idea of the earth itself *being a sphere*, it follows that, since this idea is done away with, that of *motion* is gone with it: and we may unhesitatingly affirm that *the earth does not move*. Well then: the astronomer who *supposes* that he has been looking out upon the stars from *two positions in space distant from each other one hundred and ninety millions of miles*, is mistaken: he has simply—very simply, indeed—been looking from *one position*, the earth upon which he stands not having budged an inch! So that, in Professor Airy's investigation, instead of "*eight-hundred and thirty miles*"—the distance between Shanklin and Balta—being *inconsiderable and out of the question*, it becomes the *most important element* in the consideration, and must stand for nothing short of its full value. Inasmuch, then, as the earth does *not move* to a position "*one hundred and ninety millions of miles*" away, as the astronomers imagine, a *journey over the surface of the earth must be taken and admitted to be the sufficient and the only known cause of change in the position of the stars in general, and of the North Star in particular, in relation to an observer, at any given meridian, at any time, or in any place*. Now then: as the change of the observer's place causes a change of position of the stars in relation to the observer, the journey to Shanklin and the *sinking* of the star stand boldly forward as the *cause* and its *effect*—the origin of the fact, and the *fact* itself: and, in direct consequence of this, it is evident that the *telescope* in the Zenith Sector experiment *must be shifted*; that, therefore, the *plumb-line must retain its parallelism*; and, moreover, that the stars, instead of being *infinitely distant*, are at a distance no further from us than such a distance as will, and must, admit of these various changes taking place through our own *voluntary instrumentality*. Thus, then, have we shown more than that Professor Airy's argument is unsound and fallacious, inasmuch as that we have now shown, that the *assumption* upon which it is based is likewise false, by proving that the stars are *NOT* infinitely distant as we are led to believe. And thus have we shown that the stars are said to be *infinitely distant* because the earth is *supposed* to be a *globe*; and that the earth is *supposed* to be a *globe* because the stars are said to be *infinitely distant*! Thinking Men! you scarcely need, now, to be reminded that *Theoretical Astronomy*, instead of being founded upon downright, upright, and straightforward facts, takes its rise from some obscure spot in the circumference of a "*round-robin*" of anticipation and assumption and supposition and delusion!

But the question comes up again, *Where are we now?* Well then, if we look back, clear over the heads of the many objections which have been raised, we shall find our true position. In the days of marbles and of tops, which is about as far back as we can go with any degree of certainty, we were taught—and took it all for granted—that we were 95 millions of miles away from the sun; and that this distance is to the astronomer just what the yard measure is to the draper—a means by which to arrive at a certain end—a measure—a standard. Years roll on. 'Well, my lad! how far is the earth from the sun? How far is

'Mercury? and Venus? and Mars? Ah! my boy: *you* ought to be very 'thankful that you have had so many privileges; we were not taught 'half so much in *my* young days.' Years roll on, again. *Telegraphs*, containing the latest intelligence, cost one penny. We read: "*The whole of the assumed distances in astronomy must be altered.*" We rub our eyes. Yes: it is "*assumed!*" and it is "*altered!*" What's the matter, now? 'O, nothing—nothing,' says the astronomer: 'only four tenths of a second to be added to the sun's parallax, that's all.' '*Drat your parallax,*' says young Hopeful: 'you've altered all my figures! Do you call it '*nothing* to cut off four millions of miles from your measuring rod? Is 'it *nothing* to take off 122 millions of miles from the distance of the 'planet Neptune? Nothing? Then it's just nothing that you know 'about the distance of *any* planet! And you call yours an 'exact' 'science, too!' 'Stay,' says Philosopher, as he claps his broad hand on the shoulder of the young aspirant: 'Thus has it ever been. Pro-'found as is astronomy, and its problems intricate, it stands out clear 'as the meridian sun, if compared with the science of the human mind. 'Man has sufficient self-complacency to overcome all anxiety on account 'of future contingencies. We think that, whilst we speculate, we know; 'and that, whilst we dream, we reason. And how wise is this arrange-'ment! Hard, indeed, would have been Newton's pillow, had he but 'dreamed how false were his ideas: yet his figures have been *doubled* by 'his successors! And although the supposed distance of the earth from 'the sun—or, if you please, the measuring rod—has been altered to the 'extent of *one hundred millions of miles*, the astronomers of the present 'day are as undisturbed as was Newton, and imagine that the distance 'of the earth, which has just gone down *four millions*, will fall no more. 'Thus are they happy.' Still, time rolls on. "PARALLAX" came; *we saw*; *he* conquered—and he conquered, *we saw*. "Copernicus, seized with "a noble frenzy, took the Earth, and sent her far from the centre of the "Universe, where she had been placed,"—says M. Fontenelle, the astron-omer; "PARALLAX," with steady Reason, brings her back again, say *we*. "Earth is not a globe:" hence astronomers cannot prove it to be one. They try; they fail. There are "proofs" and "proofs." Earth is said to be a heavenly body: but the "proofs" are *no* proofs. Earth is said to be a planet: but the "proofs" are *no* proofs. Earth is said to be a sphere: but the "proofs" are *no* proofs. "By actual observation," says Schöedler, in his *Book of Nature*, "we know that the other heavenly "bodies are spherical, hence we unhesitatingly assert that the earth is "so also." But assertions the most unhesitatingly given are the least *likely to be* proofs. The earth is said to be a globe, because the water is said to have a curved surface: a mere assertion. It is a globe, be-cause surveyors "allow for curvature:" a mere delusion.—A globe, because ships have sailed round it: a mere absurdity.—A globe, because the hull of a ship soon gets behind the water: a mere fallacy.—A globe, because it casts a circular shadow on the moon: a mere speculation.—A globe, because the horizon of a spectator is circular: a mere whim.—A globe, because ships go *one way* and get back again: a mere decep-tion.—A globe, because it is "a body which, *however* seen, always ap-pears circular:" a mere trick.—A globe, because the direction in which

a plumb-line hangs is not the same at different places: a mere mistake. —A globe, because the Bible speaks of it as being one: a mere hoax. —A globe, because we have been taught that it is so: a mere misfortune. "On a knowledge of the true figure of the earth," says Dr. Dick, in his work called *The Solar System*, "depends our knowledge of its magnitude 'and dimensions; and on our knowledge of its magnitude, depends our 'knowledge of the distances of the sun and moon; and on our knowledge 'of the distance of the sun depends our knowledge of the respective distances of the planets, and the extent of the solar system; and on our 'knowledge of the extent of this system, depend our conceptions of the 'distances of the fixed stars, and of the vast magnitude and extent of 'the material creation; and on our views of the immensity of the universe, depend the enlarged conceptions we are now enabled to form of 'the attributes of that Almighty Being from whom we derived our existence, and whose 'kingdom ruleth over all.'" *Where are we now?* What, the name of the ocean?—what, the ship?—who, the captain? What—*chain* is this we hold. Tis "Reason" in command! The ship? 'tis not the "Error:" *she's* gone down! "*Excelsior*" is the name! The ocean? "*TRUTH*:"—the "unexplored" of NEWTON. The chain?—the link we hold—"The Earth's Rotundity!" Fling it over! The next link? "*The Earth's Magnitude and Dimensions!*" Let it go too! The next, and next? "*The Distances of the Sun and Moon!*" "*Our Knowledge of the Extent of the Solar System!*" "*Our Conceptions of the Distances of the Fixed Stars!*" Each link must go! And what is this? "*Enlarged Conceptions of the Attributes of that Almighty Being whose 'kingdom ruleth over all.'*" Yes: even this link must go. But what have we done? Have we thrown over a single atom that might have reflected a ray of Omnipotence? God forbid that we should. We point, at once, in language bold and scientifically true—in words which *Theoretical Astronomers cannot use*,—to "HIM that stretched out the earth above the waters,"—to "HIM that made great lights:" "the sun to rule by day;" "the moon and stars to rule by night,"—to "HIM who of old laid the foundation of the earth,"—to HIM by whom "the world is established that it cannot be moved,"—to HIM who made "the earth standing out of the water and in the water,"—and to HIM who literally and truly created the "heavens above," the "earth beneath," and "the water under the earth." MEN of INTELLIGENCE: *Where are we NOW?* FAITH! Embarked on the vast ocean TRUTH, pointing to the brilliant horizon which surrounds us: and we stand, FIRM, in the assurance that the best commander in the storm is *Reason*; we stand, CONVINCED, that the *upward* and the *onward* motto is the best for the ship; PROUD, with the knowledge that we have thrown over a chain that has bound us, not saving a link; SATISFIED, in having cast away those "enlarged conceptions" of GOD which overshoot the mark, and which lead straight on to unbelief in the very existence of a SUPREME INTELLIGENCE; and we stand, DETERMINED, at all events, to maintain our course of action in defiance of the pride and the bigotry and the ignorance which oppose us—and of the lukewarmness which leaves us alone,—and to fight manfully and continuously for the flaunting FLAG of REASON and of "COMMON SENSE."

MAN'S BEST FOOD.

A REPLY to a Work by Dr. E. LANKESTER, F.R.S., "On Food."

By "COMMON SENSE."

Publisher, —J. BURNS, No. 1, WELLINGTON ROAD, CAMBERWELL.

Price Sixpence.—With Illustrations.

Theoretical Astronomy Examined and Exposed.

By "COMMON SENSE."

CONTENTS OF PART I.

The "Exact" Science of Astronomy... Sun's Distance varied from three-and-a-half Millions to a hundred and four Millions of Miles! ... The Velocity of Light... The Daily Telegraph and the Greenwich Astronomer... Astronomers' "Corrections"... Rev. C. Pritchard's advice ... Sound versus Sense... Mr. Hind's version, —122,000,000 of Miles cut off Neptune's Distance, at one stroke!... "Parallax" ... Rev. R. Main's "Proofs"... Suppositions... Dr. Lardner and the "Planet" ... Dr. Lardner's Concave Convexity! ... Mr. Glaisher's Balloon "Observation" a flat Contradiction ... R. Burchett, Esq. on the View from a Balloon, &c... Lord Brougham and Sir D. Brewster ... Rev. D. Olmsted :—his ingenuity!... The "Spherical Loadstone"... Supposition and Delusion.

CONTENTS OF PART II.

Galbraith and Haughton's Manual ... What is Theory?... The one thing needful:—simple and direct proof... Figure of the EARTH... The Horizontal Line ... Arguments are useless when based on assumptions... The Traveller and his money... Belief versus Knowledge... Dr. Mann... His "Large Round Ball"... Rev. J. G. Wood... The Boundary of the Sensible Horizon on a Level Plain... Extraordinary Navigation... Reasoning in a Circle... The Fly on the Orange... Dr. Mann's argument upset... Is there no distinction between "level" and "convex"? ... Mr. Willard... His "Proof" shown to be no Proof—like all the rest ... Mr. Glaisher's "Observation" Corrected and Remodelled in the Leisure Hour... M. Fontenelle on Hypothesis... &c.

CONTENTS OF PART III.

The 'onus probandi' on the Astronomers' shoulders... Is water level, or is it not? Webster's Propositions examined ... What a level surface really is ... An observation by Mr. W. T. Lynn, of Greenwich Observatory... Ponds, Lakes, and Oceans level... The "True" and the "Apparent" level of Astronomers... What is a spherical level?... Its absurdity... Joyce's Scientific Dialogues ... The Reverend gentleman says, the true level is not a straight line, but a curve!... The allowance said to be made by Surveyors... The Cat let out of the Bag... Surveyors' Back and Fore-sight ... A Delusion or a Cheat... The surface of the Earth all top... The new Brass Plate in the wall of Greenwich Observatory ... The STANDING ORDER... One more so-called Proof of Rotundity gone... Excelsior!

CONTENTS OF PART IV.

Sir John Herschel takes the Copernican system "for granted"... A bold step : but proved to be a wrong one... "Iconoclast" and Mr. Woodman ... Travelling "more than a hundred thousand miles" in a few minutes! ... An Astronomical Joke... M. Arago and his want of confidence in his own senses ... "As the Old Cock crows, the Young Cock learns"... The Tailor and his Coat... Sir John Herschel's "Thread" and "Pearls"... The First Step in the Wrong Road ... An Earthly Body said to be the Chief of the Heavenly Ones! ... Astronomical Arguments, Schemes, Tricks, and Conclusions... Mr. Glaisher once more ... Sir John Herschel himself testifies that Astronomy is founded on Imagination... Truth must out sometimes... A Word of Advice, &c.

CONTENTS OF PART V.

Sir Richard Phillips, and Newton's "execrable superstitions" ... Further Examination of Sir John Herschel's celebrated Treatise ... "False and Fanciful Theories" Illustrated... Bradley's Geometry ... The "invisible" and the "imaginary" ... Land is in the Water... What St. Peter says is scientifically correct... Sir John's Conclusion with a New Face upon it... What next, and next?... Exeter Hall Lecture on Balloon Experiments ... Sir John Herschel and his "spherical slice"... A little bit of Good Management... The Hay-makers on the Coast of France... Sir John and his "DATA"... The Complicated Problem... Sir John and his Arithmetic... His "round" numbers ... Sir John's "rough" result!... The Book of Nature and its Teachings... The Shilling Magazine, —&c.

CONTENTS OF PART VI.

Professor Airy's Six Lectures on Astronomy to Working men... The Earth's motion ... "Do you believe it?" ... Professor Airy's "grounds for the belief"... Likelihood and Probability... "So much the Worse for the Facts!... Regularity and Punctuality... "Seeming" to Move, and Moving "Sensibly"... A "Strong Proof"... "If the stars be fixed, we move!" ... The Grand FACT, on Professor Airy's own authority ... "Why do NOT we turn?" ... Perspective... "Something Curved!"... How it is that Ships Circumnavigate the Earth... A CHALLENGE for Professor Airy... The Zenith Sector ... The way in which it is said to be used, a Delusion or a Fallacy... The Leak in the Ship of the Astronomer Royal... Absolute and Relative Position... The Sinking of the Ship!

JOB CAUDWELL, 335, STRAND, LONDON.

William Carpenter, Printer, Greenwich.

THEORETICAL ASTRONOMY

EXAMINED AND EXPOSED:

By "COMMON SENSE."

WHAT PEOPLE ARE TAUGHT IN 1866!!

"A French professor has just made the discovery that the earth turns less rapidly than it did some 2,000 years ago, the falling off in the speed being somewhere about the fiftieth part of a second. The learned man affirms that the slackening will continue at such a rate that in 1,600,000,000 of years the earth will come to a complete stand-still."—LONDON JOURNAL.

CONTENTS.

A Fact stated by Professor Airy! ... From East to West, or from West to East? ... Travelling in two opposite directions at one time! ... Two sorts of 'appearances' ... Miserable Confusion ... The "Apparent" Annual Motion of the Sun ... It is "necessary to have" the Stars fixed! ... What Theory demands, Theory gets ... "It is not, and, therefore, IT IS; it is, and, therefore, IT IS NOT!" ... The Spoiled Child ... A Review of Facts ... Observations of the Heavenly Bodies ... The Stars Travel Faster than the Sun ... 'Theoretically' and 'Really' ... Debtor and Creditor The Astronomer Royal Explains the thing "differently in another way." ... "Either Supposition will do."! ... No inconsistency in "supposing" anything ... Blunders ... Revolutions of the Planets ... The Highest Pitch of Controversy ... Earth "a Moon!" ... Weighing the Earth ... Light ... Darkness ... Speculation ... Beautiful—Charming—"Delightful Uncertainty"!! ... "PARALLAX" to the Rescue! ... The Zetetic Philosophy ... A Chain of Facts ... Theoretical Astronomy Examined and Exposed ... "Heaven our Home" ... Opposite Directions ... Christian's Penny Magazine ... "3000 Universes" with Heaven in the Distance! ... Absurdity!—Folly! ... End of "Theoretical Astronomy."

LONDON:

JOB CAUDWELL, 335, STRAND, W.C.

CHAPTER VIII.

"WE see the sun, moon, and stars," says Professor AIRY, "every day turning from East to West." This is perfectly true: and, in fact, it is one of the most evident things in nature. 'But then, we are liable to be 'deceived,' it will be said: 'and Professor Airy does not mean that 'the sun, moon, and stars really *do* turn round the earth every day, but 'that it merely appears so.' A curious thing—this *appearing* to move, and yet standing still! A curious thing—this *being deceived*, every day of our lives, by Him who we suppose has brought our nature into harmony with the Nature which we see around us! Very curious indeed. Perhaps, however, it is man deceiving his fellow man, after all, and that no blame whatever is to be laid at Nature's door. The question may be somewhat interesting: let us see. The words which we have fixed upon, and which form our 'text,' are to be found in the volume which we have not yet done with, namely, Professor Airy's *Ipswich Lectures*—or, to be exact, as we should be, Professor Airy's *Six Lectures on Astronomy*,—in page 76. The words are literally—absolutely—*true*! It really seems, however, if we refer to almost any other page in the book, that, so strange and contradictory are these words, they must have *slipped* away from the Professor, unknown, and, consequently, unregretted. The burden of the song is this—and we take a line at random, (page 63),—"The Sun travels round in the direction from West to East among the stars." *From West to East!* It was *from East to West*, just now! But, it may be, that one direction will do as well as the other, since Professor Airy gives us what he calls "the simple explanation," in page 85, that "the Sun is a fixed, or nearly fixed body." But we are speaking of *motion*: and we find that we are absolutely desired to believe that, whilst the sun is continuously moving in one direction, he is also continuously travelling in an *opposite* one! Now, in order to believe this, it would be positively necessary to become members of that body which, according to ARAGO, has ceased to regard the evidence of its senses: a step, this, which seems to be somewhat unadvised in the present state of things. Let us look, then, carefully, at the proposition that *the sun travels in two opposite directions at the same time!* First, then, the motion of the sun from *east to west* is the common, every-day motion, apparent to all the world. But Copernicus, we are told, "was not satisfied" with this easy-going state of things; and *he*, accordingly, *altered it!* *He* *FIXED* the sun in the CENTRE, where *he thought* it ought to be! The motion of the sun, then, as it *appears* to *us* is not the motion which *appears* to the astronomers. Whilst, to *us*—ordinary people—the sun appears to rise in the east and set in the west, in the course of *one day*, to *them*—extraordinary people—the sun appears to travel in the opposite course in the space of *one year!* To *us*, the sun never appears to stop in his

onward course *westerly*; to *them*, he never appears to stop in his onward course *easterly*! Now, it must be evident to any individual who has sufficient intelligence to comprehend the fact that two and two makes four, that these opposite appearances cannot be *presented* at the same time; and that, therefore, to account for the assertions which, if taken together, imply that it really *is* so, we must look for some abnormal feature in the case, or for some mistake in the description of it. It is quite certain that if a thing is going one way it cannot be going the opposite way; if a body travels to the east it cannot be going to the west. Now, there is room for great misapprehension with respect to the word *appearance*. A boy falls into a pond which is as green as grass, and, of course, presents, afterward, a verdant appearance—as though covered, in fact, with a mantle. ‘Tommy,’ says the mother, ‘it *appears* to me that you’ve been into the duck-pond!’ *She*—good woman,—making use of the senses with which *she* is endowed, finds the conviction irresistible. *This* is a genuine case: a real appearance is presented, and there can be no mistake. Again: the boy is sent upon an errand; and the ‘*change*’ is a penny short of the anticipated amount. ‘It *appears* to me, my boy,’ remonstrates the mother, ‘that you have been buying some *sweet-stuff*!’ and have been trying to deceive *me* into the bargain!’ (And why should not women in general be allowed to be rash *sometimes* even as the astronomers?) Now, the fact is, we *know* Tommy:—his mother was wrong, *this* time; and *he* was as innocent as an unfledged chick of anything in the shape of barley-sugar or brandy-balls. The *appearance* in this case was not a *genuine* one: it was speculation—anticipation—a jumping to a conclusion—a mistake! Just this kind of ‘*appearance*’ is that for which astronomers are for the most part solicitous. ‘The sun,’ say they, ‘*appears* to travel from *west* to *east*, continuously, completing the circle ‘in one year.’ One astronomer has followed another, and this *appears* to all the *orthodox* astronomers to be the case. But does this thing “appear”—in the most common and sensible acceptance of the word—to anybody? Certainly not. Do not be deceived, then, Working Men of Ipswich or elsewhere: it is only a theoretical, speculative, brain-born thing, altogether independent of man’s senses, this so-called *appearance* of the sun moving in a direction *opposite* to that in which it evidently moves to all who are blessed with the gift of eye-sight. “We see the sun, . . . every day turning from East to West,” says Professor Airy. This, then, is the common—the vulgar—appearance. “The Sun travels round in the direction from West to East among the stars,” says the Professor. This, then, is the theoretical—the speculative—appearance. Let the two, never be confounded. But, it will possibly be said, ‘If the Professor really says that the Sun *travels*, how can he also say that ‘the Sun is a *fixed* body?’ *How?* Why, every conceivable thing is said, in its turn, about the sun, moon, planets, and stars—the *earth being supposed to be a planet*! When the Astronomer Royal says that the sun “travels round” as he says he does, it must be borne in mind that *he* is allowed free access to every latitude and longitude of expression. He means to say—taking the *majority* of his assertions for our guide—that the sun is “a *fixed*, or nearly fixed body,” although, in some places, he speaks of the *theoretically apparent motion* as a *real* one, and, again, of

the *commonly apparent motion* as a *real* one likewise, notwithstanding that they are opposed to each other! But we must be charitable. All this miserable confusion is the result of circumstances over which, it seems, Professor Airy has not had strength to jump. A dangerous and an unthankful effort, personally considered, would be this flying leap—out of one thing, *perhaps* into another,—and if our Astronomer Royal be not prepared for danger or unthankfulness, How is *he* to help it? It may be that an astronomers' *day* will dawn yet.

But the question may be asked 'How in the world is it that astronomers talk in this unreasonable way?' To which the answer is, One error breeds a thousand. Once *suppose the earth to be a "planet,"* and away goes all chance of reasoning at once; and confusion only remains to tell the tale. And what a tale! Is there one person in a thousand—or in ten thousand—who understands what the astronomers mean by their "apparent annual motion of the sun," a motion which is really apparent to nobody! It is very doubtful if there be. We may get some sparks of elucidation, however, from the *Lectures* before us. In page 61, our Astronomer Royal says, "I am now, however, going to speak of the Sun a little, though it is necessary to have the stars to begin with, as fixed points in the Heavens." This may seem, upon a hasty glance, to be all very well: but *look* at it for a moment. "It is necessary to have the stars to begin with, as fixed points." Why, this implies that the astronomers *have them not* as fixed points, or language means nothing at all,—no matter, either, what may be *understood* by the term "*fixed*." If an able-bodied man be asked to do some piece of work, does he say 'It is necessary to have eyes to see with, and hands to begin with!' Certainly not: it would be absurd. But, in the case of things *foreign* to the man—things which he does *not* find in his head or under the bed-clothes the first thing of a morning, such as hods of mortar and cart-loads of bricks,—it may be proper to say, as says Professor Airy, *It is necessary TO HAVE these things to begin with.* But how is it that the stars, which are evidently *not* fixed, are wanted to *be* fixed? It is *theory* which demands it—that pre-eminently lucid Copernican theory which is supposed to leave nothing obscure or doubtful! *And for theory to demand a thing is for theory to GET it—in theory*, of course. Well then, the stars are *theoretically* FIXED; or, if not, they very soon *will* be. Professor Airy, to obtain this "necessary" end, commences as follows:—"If you consider for a moment something else which you know and have remarked, you will see this, that the position of the Sun is different in summer from what it is in winter. In summer the Sun at noon-day is high in the Heavens; in the winter at noonday he is low. In summer the Sun is a long time above the horizon, and a short time below; in winter he is a short time above the horizon, and a long time below. In summer the Sun rises North of the East point, and sets North of the West point; in winter he rises South of the East point, and sets South of the West point." Professor Airy could not have made a better *beginning* than *this*: it is just one of those bright, clear passages which, alas! are the exception instead of the rule in the volume before us. The Professor, however, continues:—"These observations are all explained by saying that in summer the Sun is nearer to the

"North Pole, and in winter nearer to the South Pole." Now, as far as North and South "*Poles*" are concerned, the matter is a mere *farce* in the language of men who know not how to prove the earth's '*rotundity*.' In fact, the idea is gone down with "*The Earth's Rotundity*" to rise no more. Say "North" and "South," without the *Polar* appendage, and all is well. This, then, is the *commonly apparent* motion of the sun; and half-a-dozen words are almost sufficient for the purpose of describing it. The sun rises, every day, from and after June, more and more *towards the south*; and, from and after December, more and more *towards the north*. What is the consequence? Why, the daily circles are *larger* as the *south* is reached, and *smaller* as the *north* is approached. Professor Airy, in the next place, gives us an account of the *commonly apparent* motion of the *stars*—*likewise from east to west*, as a matter of course,—in fact, of the genuine *appearance* presented by the heavenly host. He observes that, if we look out, night after night—say, the first night in each succeeding month of the year,—towards the meridian, with our face thus turned directly *southwards*, we shall see fresh groups of stars: those which had been seen previously having, by little and little, moved to a position further round to the *right hand* (as we stand in this position), or, towards the *west*—the *same hour* being appointed for the observation on each separate evening. Here, then, are two sets of facts brought under our notice—FACTS which must continue to be through all time, and to be remembered through the unknown beyond. Now, by all that is sacred and Godlike in Truth, and by all that is devilish and undesirable in Error, let us hear what Professor Airy says of these two simple sets of facts. It is in page 63 we find these words:—"Now, 'what is the inference? Is there any peculiarity in the motions of the 'stars? No, it is the motion of the Sun. Our hour of eleven at night 'is referred by habit to the motion of the Sun; and thus, when we 'speak of eleven o'clock at night, we mean that the Sun is in a certain 'position; and, therefore, that the stars have moved in a direction from 'East to West, with respect to the Sun.'" What a paragraph is this! How thoroughly astronomical! *First*, there is "NO" peculiarity in the motions of the stars; *next*, the peculiarity is with the Sun; and *next*,—and "*therefore*,"—there IS a peculiarity in the motion of the stars: they "*have moved in a direction from East to West*." Thus we see that in a single breath Professor Airy has the stars fixed and in motion also! It amounts, in fact, to this:—It is NOT the stars, and, therefore, it IS the stars; it IS the sun, and, therefore, it is NOT the sun! But, how then *does* our Astronomer Royal get the sun to move, "*from West to East*" in his "*annual circle*," after all? We shall see. Will it be said that he has just *spoken* of the motion of the sun?—perhaps so. Why! this was the *other* motion—the *commonly apparent* motion—the *every-day*, *east to west* motion which causes eleven o'clock to be "*eleven o'clock*!" The Astronomer Royal may *conceal* this fact, but it *cannot be hidden*. Saying that the sun is "*in a certain position*" must not be the means of shutting out from our minds the way in which he came to this position! But *The Annual Motion*! How comes it to be entertained?—that is the question. It is in this wise. Professor Airy says, in the next line, 'But this may be interpreted another way. Regarding the stars as

"fixed objects, we get this: the Sun travels round in the direction from West to East among the stars." And the Professor jumps into another question at once! Stay we *here* awhile. "*Regarding* the stars as *fixed* objects!" Oh!! Why, it is not a minute since *they moved!* "*Regarding*" them, too. One would like to know *how*, and *why*, and *all about it!* The very best and strongest *regards* of an Astronomer Royal will not stay the stars in their everlasting rounds, nor prevent the human race in learning the fact that they *do really* revolve. But we have said that *for theory* to DEMAND a *thing is for theory* to GET it! Well then: *Theory* HAS demanded that the stars be fixed; and *Theory* accordingly has them fixed. *Theory*, then, as the Astronomer Royal says, gets this:—"the Sun travels round in the direction from West to East among the stars!" Is it not plain that *Theory*, like a poor, miserable, spoiled child, gets just what she cries for? and that she is so senseless that, if she cannot get the real thing, she may be deluded and cajoled by being supplied with the spurious? But it will be asked, By what scheme is the idea made plausible? How is it that it so much resembles current coin as sometimes to pass for it? We will just review the facts, and see if we can ascertain how it may be. We get our time directly by the sun. At twelve o'clock at noon begins the astronomers' day. The sun, *then*, is at his highest apparent elevation, or, over the meridian of any place in question—say, at Greenwich. Were it not for the light of the sun, stars would be seen at this time, and in the same or any other direction. But, as the light of the stars is by it rendered of no effect, in order to see *them*, we must wait until the night-time. Say, it is eleven o'clock. Remember that we are facing the *south*; and that, therefore, the heavenly bodies are all travelling round towards the *right* hand, or, to the west. Remember, then, Professor Airy's words:—"We see the sun, moon, and stars, every day turning from East to West." And let us, before we shall be prevailed upon by anyone to imagine that we see any of these bodies going *the other way*, think for a moment of the unfortunate circumstances which attend thousands of our fellow men confined within the precincts of certain asylums in this country! Well then: the heavenly bodies, though they all go round one way, *do not all go round together*, as we shall see. Let us watch the *relative* motion of the sun and stars. It is eleven hours, now, since the sun passed the meridian; and we now see certain stars, *over*, or *on*, or *in*, the meridian. We see them travelling steadily onwards; the sun, though out of sight, is doing the same (we may be sure), or he wont get round by the morning. How, then, can we compare their motions? We must wait until *another* night, or, for a more striking comparison, *another* month. But we are anxious. Twenty-four hours elapse: and we are at our post again. Again, the sun has passed the meridian eleven hours since. We look in precisely the same direction: and what do we see? The stars we noticed before have gone *further onwards in their journey!*—just so much further onwards that, had we been here *four minutes* sooner, we should have found them *again* in the meridian, as we saw them yesterday. We reflect, for a moment. *To gain four minutes in one revolution is, in the regular order of things, to gain four minutes in ANY revolution: and, hence, in EVERY revolution. This, in three hundred and sixty-five*

revolutions, is twenty-four hours! So that, in twelve months, the same sort of appearances occur again. But we wish to see this more clearly. We are again at our post; and, again, it is eleven o'clock—this time, it is a month since we were here. The sun is still in the same comparative part of its daily course as it was in before: (although, now, being the month of *May*, for instance, its circles are getting smaller). But, where, now, are the stars which we particularly noticed a month ago? A twelfth part of their daily course further on towards the west. We reflect, again, for a moment. The stars are overtaking the sun, then! It is even so. In order to have seen our particular group of stars on the meridian, we should have been here TWO HOURS ago! Again: it is in the month of *September*:—more than five months since we first observed the stars on the meridian. It is now eleven o'clock. The sun is now, as it was then, eleven out of twenty-four parts onward in its daily journey; and the stars we looked at are now gone out of sight altogether—their place on the meridian being filled by others. Where, then, are the stars by this time? Five months and a half, since we first saw them, they are eleven out of twenty-four parts gone in their annual recapitulation of position relative to the sun. We reflect again. The stars are now, then, just where the sun is, in relation to us: or, again, they may be said to have overtaken the sun; and, in order for us to have been here when they were on our meridian, TO-DAY, we should have had to be here ELEVEN HOURS ago:—and then, for the sun-light, we should not have been able to see them. It is eleven o'clock, once more. A month is passed since we were here. Where, now, are the stars we have been watching? One twelfth part of their daily journey still further round the heavens. Again we reflect. The stars have gone past the sun, then, in relation to us:—the sun itself being still on his way but eleven twenty-fourths of his daily round! Now, the stars in question, instead of being to the LEFT of the sun, are to the RIGHT of his position in relation to us! And thus we may go on with our reckoning until we shall find that, in one year—that is, by the time the phenomena begin to recur,—the stars will have gained one complete revolution in relation to the revolutions of the sun. And again, this will be three hundred and sixty-six revolutions of the stars to three-hundred and sixty-five of the sun! And even so is the fact. What, then, follows? Just this. In the course of a year, the sun, in lagging behind the stars, “appears,” to those who ignore facts and acknowledge theories, to travel round the other way!—and, down it goes, as “*The Sun's Apparent Annual Motion among the Stars from West to East!*” Look at those two men, yonder, racing in a large circle. They have so many rounds to go in order to run the given distance. By regular degrees, one man loses a whole round in the course of the race: so that, at certain times, he may be seen, with respect to the winner, further and further in the opposite direction to that in which both men are running. Now, says one of those very curious people with a crotchet to uphold, in language which indicates an utter disregard of plain facts, and a want of the knowledge that a man cannot run both backwards and forwards at the same time, ‘*It appears to me that the losing man has been running the other way all the while!*’ Now, would not many persons call this curious individual, in most unparliamentary language, “a fool?” This would be very wrong, because the

individual with the crotchet could n't help it. But then, perhaps, on the other hand, people who say very wrong things cannot always *help it*. Thus have we seen how it is, in all probability, that the idea of the sun's motion contrariwise to the real appearance of things is brought about. We have seen that it is a mere question of *the time in which* the heavenly bodies perform their several circuits relatively to each other, and *not* as to any backward or contrary motion. We have seen that Professor Airy is perfectly right when he says that "We see the sun, . . . and stars every day turning from East to West." And, surely, by this time, we must be quite satisfied that, when he says "The Sun travels round from West to East among the Stars," it is utterly at variance with the facts, with reason, with "Common Sense," and with his own very words.

The stars, then, are only *theoretically* fixed, and *not really* so. The sun only *theoretically* moves towards the *east*, or, to the *left*, and *does not really* do so. Now, in page 77, in the volume before us, we find the following remarks. The Professor is speaking of the stars, and he says, "You will observe from one month to another (if you always look at the same hour of the night), that they will travel away to the West. These motions are referred to the sun, by our habit of using solar time; that is to say, at the same solar hour, or when the sun is at the same distance from the meridian, the stars are travelling away to the right; or in other words, the sun travels away to the left amongst the stars." Well, is this right? If we heard a man say to another, 'I owe you a pound; or, *in other words*, you owe me a pound!' what should we think of him? We should not think that *he* was a fool, at all events. But, *is it right?* Can this sort of thing be tolerated by thinking men? *The motions of the Stars are referred to the Sun—as a standard,—and "the stars are travelling away to the right; or in other words, the sun travels away to the left."*!! Why, which way is the thing to be settled? As, in the case of the two men—there being a 'difference' between them,—one must be the debtor, and the other, the creditor: so, in the point in question, the real state of affairs must be settled. "In other words," Does the sun travel to the left? or does it not? Do the stars travel to the right? or do they not? Does the sun even "appear" to travel to the left? *or does it not?* Says Professor Airy, in page 65, "But as it appears to describe a great circle, then we can assert that the sun appears to be moving in a plane round the earth." We have asked the question, and we repeat it: Is there one man in ten thousand to whom such a thing as this "appears?" Sincerely do we *hope* not! "Now we come to the question,"—continues the Professor,—"Cannot we explain this differently in another way?" *Don't laugh!* It is a serious matter. "Differently in another way!" We have already had the thing explained "differently" in *one* way: and if we now have it explained "differently" in *another* way, will not the complication be *doubled!* Let us see, however, what it is! We must tread gently on such ground as this. We next read, "Is it certain that the sun is moving in a plane round the earth, or is it certain that the earth is moving in a plane round the sun? Either supposition will do." What do you think of *this*, Reasoning Men! "*Either supposition will do!*" Are these the things you so much desire to have?—*suppositions?* Why, you are able

to make these *yourselves*, if you desire to do so, without the special services of an Astronomer Royal! Says Professor Airy, "At the present moment we have no evidence to guide us; we have nothing to tell us whether the sun is moving round the earth in a plane, or whether the earth is moving round the sun in a plane." To which we respond,—*Certainly not*: both suppositions are wrong—utterly wrong! Do not let us mistake the motion of the sun now spoken of for the sun's *daily* motion: O, no! *This* motion—apparent to everybody—is rarely seen in astronomers' arguments. The motion here spoken of is the *theoretical—West to East—impossible—*motion: and, therefore, is it classed amongst *suppositions*! "But," says the Astronomer Royal, "we shall shortly have evidence on the point." And he continues: "In the mean time, I will mention this, that there is no inconsistency in supposing that the earth does move round the sun." *Certainly not*: there would be no "inconsistency" in supposing that sun, moon, planets, and stars were all 'made of green cheese' together! The inconsistency, should there be any, would be in palming-off the supposition as a scientific piece of business. And, really, how many volumes could be compiled having in them nothing but astronomical inconsistencies, we know not! This much, however, must be said: the whole of the inconsistencies, mistakes, contradictions, suppositions, fallacies, and delusions, in connexion with *Theoretical Astronomy*, have taken their rise in the one grand error of *The Earth's Rotundity*! It would, therefore, be unfair to particularize a hundredth part of them—and almost as unprofitable as unfair. The whole of *Theoretical Astronomy* from beginning to end is one immense muddle, in consequence of but one thing—the mistake in the figure of the earth: and, just as it would be unfair to rap a boy's knuckles for every wrong figure in his arithmetical exercise when each mistake arose from one mistake at the beginning, so would it be unfair and unwise to wound the astronomers' feelings more than we are compelled to do. It must be remembered, however, that, when the boy fails in his efforts to work out the proof of his exercise, he looks out for blunders: why should not astronomers do so likewise? Have they proved a single step of their theory? *Not one*! And, in Professor Airy's *Six Lectures*, do we find any evidence at all—a single fact—in the smallest degree calculated to weaken the position we have taken up? We say, honestly and truly, *We do not*! Let those who value Truth, then, see that they get it.

"We see the sun, moon, and stars, every day turning from East to West." So says our Astronomer Royal. Unfortunately, however, as we have seen, the whole tenor of the volume before us is a positive denial of the fact. We have seen that the sun is said to have an *apparent* motion from West to East in one great circle which the astronomers suppose to be completed in a year. Now, with regard to the moon, it will be found that her case is viewed in the same light as that of the sun. *She* is said to revolve in a circle round the earth in a month. But, just as it is with the sun, so is it with the moon. The circle which she is supposed to make, *from West to East*, whilst presenting to us her various phases, is thus imagined to be a complete monthly circle in consequence of the extent to which she keeps lagging behind *all* the other heavenly bodies day after day. This is really the whole secret!

And it is the very *slowness* of the moon's motion which has led in this way to the belief that she makes the most rapid revolution of them all. Again: in the case of the planets, it is just the same. They are all said to have a distinct motion *from West to East*, contrary to the way in which "we see" them travel every day. And, just in proportion as they revolve about the earth *slower* than the stars, so is *their* revolution about the *sun* taken to be the *quicker*!—Just as they revolve about the earth *quicker* than the *moon*, so is their revolution about the sun said to be slower. Thus, next to the moon in lagging behind the others is *Mercury*. Nearly eighty-eight days it is supposed *he* takes to make one revolution. Then comes *Venus*. Nearly two hundred and twenty-five days is *she* supposed to take over *her* journey. Then comes the planet—monstrous absurdity!!—then comes the planet *Earth*! *We*, being on this planet, are supposed to be the victims of an illusion—as, also, are the inhabitants of the *other* planets supposed to be,—and, whilst the sun "appears" to go round us in three hundred and sixty-five days, it is *we* who go round the sun in this time!! Then comes *Mars*. The revolution of this planet is supposed to take six hundred and eighty-seven days. Here the circumstances alter. This planet arrives at the meridian, day after day, about three minutes *earlier* than the sun—so that *he*—*Mars*—is nearly up to the *stars* in his real motion, and *his* orbit is set down, as we have seen, as taking nearly double the time occupied by the *Earth*! Then come other planets. Look at *Uranus*, for example. More than eighty-four years this planet is supposed to require to make one revolution. And just imagine, too, that, as the *time* becomes to be enormous, so is the *distance* preposterous. So that when we get to the planet *Neptune*, which really revolves round the heavens as much like a star as one pea in a pod is like unto another, *he* is said to be 2864 millions of miles away from the sun, and to take more than one hundred and sixty-four years to revolve around it! Only imagine the immense time of revolution, and the astounding distance from the sun, of some planet (otherwise, star) yet to be discovered lagging behind the *other* stars to the extent of some infinitesimal fraction of a second! The idea is quite overpowering: we submit it to the astronomers.

Here, then, we have the celebrated Copernican Solar System in one view before us. The most profound piece of presumptive idealism ever formed by man! Of all absurdities, it stands the most absurd; of all monstrosities, the most monstrous; of all complications, the most complex; and of all speculations, the most wild, rash, and unreasonable! Do we enter into details,—they have never yet been fixed and never will be fixed! Do we enter into explanations,—astronomers themselves are lost: the child of their brain defies them; and the very A B C of their theory is to themselves unexplained! To speak of the magnitudes and distances and velocities and densities of the heavenly bodies is utterly a waste of time, and a presumptuous farce:—they'll all be different to-morrow. Concerning the heavenly body nearest to the earth—the moon,—astronomers confessedly know as little about it, theoretically speaking, as the child that cried to have it. For years and years has controversy run to its highest pitch—almost to screaming point—as to whether the moon does or does not rotate upon her axis: and, with the present ab-

surd theories hanging round astronomers' necks, they never will settle the question,—the thing is impossible. It is well known that, whilst Newton maintained the fact of the moon's rotation, Galileo and Kepler held the opinion that it does not rotate. And the thing is so mixed up with complications and impossibilities that there is not an astronomer of the orthodox school living who can explain it. And is not the moon said to borrow her light from the sun? Have we not all been taught this dogma ever since we were old enough to understand that crying for the moon would n't help us to get it? It may, indeed, be doubted whether "PARALLAX" *ever did* believe it. And when we say that the thing is absurd, we are, *in truth*, borrowing light from "PARALLAX." *He* says this thing, and we say the same: we cannot get out of it if we would. But look at the sun and the moon! Why, the light of the sun is one thing, and the light of the moon is another thing altogether! It is totally different in its nature—having in it *no heating power*,—and diametrically opposite to that of the sun in certain effects. Again: who has not many-a-time seen the rising sun *stealing a march* upon the moon, and putting her light out! Why, the nearer the sun gets to the moon, the more he robs her! Perhaps astronomers consider this to be the paying back in the morning of that which was borrowed for the night. Again: the earth is to the moon—a moon! Thirteen times more light—according to *modern theory*—does the earth give to the moon than the moon gives to the earth! And yet, hear what Professor Airy says about the influence which the earth possesses over the moon. In page 196, we find, after the most complicated and astonishing calculations, that "the earth's attraction draws the moon in one second" a distance of "*five hundred and thirty-six ten thousandths of an inch!*" A long time will be, yet, ere the ungrateful moon rush full swing into the arms of Mother Earth. By the bye, would not some Jack Tar like to see the fellow that lifted the old Dame into the scales when the weighing took place. We tell the weight, *under the rose*:—according to astronomers, it is just "*six thousand millions of millions of millions of tons!*" Really, this ought not to go *any further*. But is it any wonder that the moon turns pale at the approach of the sun? We are told, with becoming gravity, that "the rays of the sun have an illuminating power of *thirty-five thousands of millions of millions of millions of candles!*" It is a *fact*—that Dr. Vaughan says so. Is it at all surprising, then, that the planet Neptune, although *two thousand eight hundred and sixty-four millions of miles* (theoretically speaking) away from the sun, should be illuminated by such a flare as this? Strange, though, that *Earth*—*ninety*—well, say *any number* of miles off: astronomers don't know how many—strange that the earth, so near, in comparison, should be so very comfortably lighted and warmed, and, in some places, scarcely the *chill* be taken off! Strange, again—but, there, perhaps it is n't *true*—that *Earth* can, by just *turning round* amidst all this blaze, put one-half of her portly body into the dark! From whence comes the darkness? Is this theoretical? '*Mental!*' Well, perhaps so: it is not difficult to experience this, at times, near home. Very few need to turn round, to get into *this* sort of darkness. Unfortunately, it may almost be *felt* all around us: and, instead of getting *more light*, it seems as though it were

continually being shut out even at the very key-hole. And, depend upon it, one of the greatest hindrances to the light of knowledge is *speculation*. Sir John Herschel says, in *Good Words*, for April, 1863, "Were the sun simply *extinguished*, the planets would all continue to circulate round it as they do at present, only in cold and darkness; but were it annihilated, each would from that moment set forth on a journey into infinite space in the direction in which it happened then to be moving; and wander on, centuries after centuries, lost in that awful abyss which separates us from the stars, and without making any sensible approach even to the nearest of them in many hundreds or even thousands of years." 'O, how wonderful!' exclaims the reader of *Good Words*: 'how *astonishing* it is that the astronomers should know all this!' For one's own part, it is astonishing what human nature may get used to in the shape of scientific *speculation* and *absurdity*! And, again: as to the nature of the sun, almost everything that one can think of—from molten glass to solid ice—has been said to constitute his bulk! The sun has not only been said to keep up his supply of matter from the tails of many millions of *comets*, but he has been said to furnish matter for the *planets* which have themselves been "shivered off from the sun by the tails of the *comets*!" The comets have not only been said to be considerable enough to supply the sun, but the light of the comets has been said to be of such a nature that, were it to be solidified, the light of one comet could be put into a nut-shell! But the stars themselves are said to be *suns*; and the light of many of them is said to take *three hundred and fifty thousand years* to reach us, at the rate of *twelve millions of miles in every minute*! It may be thought, by some who have been with us all along, that astronomical absurdity could no further go than this. But it is a mistake. *Theoretical Astronomy* finds amongst its votaries men who affirm that the Copernican Solar System,—with its planets and moons, and its wheels within wheels,—is, *altogether, moving through space*!! Sir John Herschel himself says, "We do know—almost to a nicety—the direction in which that path is leading." And he says, "at the very lowest estimate," the movement through space "cannot be taken under four or five hundred thousand miles a day." *Four or five hundred thousand miles a day*! This is *another* little motion for the "planet" which they call *Earth*! 'How many does *this* make?' We have heard it stated for a fact that the *Earth* has had assigned to it no less than *eight-and-twenty* different movements altogether! Perhaps the astronomers may reckon the number, less. But what says Professor Airy about the last *new* movement? *His* words are *these*—*these* are *his* words:—"The matter is left in a most delightful state of uncertainty, and I shall be very glad if some one can help us out of it."

Professor Airy! "PARALLAX" can, indeed, *help you out of it*! He has already helped *numbers* not only out of all the absurdities and the follies of *Theoretical Astronomy*, but he has helped them to form just and true conceptions of surrounding Nature, by giving them *facts* instead of theories, *reasoning* instead of twaddle, *sense* instead of nonsense, and things *ascertained* instead of things dreamed of or imagined. And his system is the true. It is not within the power of man to overthrow it. It will be rejected by the coward, by the bigot, by the fool: but *it must*

be received by—the man! One cannot speak the truth about Astronomy without trenching into the *Zetetic Philosophy* of “PARALLAX.” Say that the sun rises: *it is a part of Zetetic Philosophy.* Say that the sun sets: *it is the same.* Say that water always finds its level: *it is Zetetic Philosophy.* Say that man walks on the top of the earth, and that he knows nothing about bottom or sides: *it is Zetetic Philosophy.* Say that the bottom of a thing cannot be the top, and, in fact, that twice ten is twenty: *and it is all Zetetic Philosophy together!*—we cannot get out of it. *Zetetic Philosophy* admits of no theories, no assumptions, no suppositions, no speculations, and no anticipations; and it, therefore, has no absurdities, no contradictions, no delusions, no sophistications, and no things but *facts!* The only question, then, is, *What are the facts?* It is a *fact* that the Earth is in the form of continents and islands; and that these are surrounded entirely with water. It is a *fact* that these continents and islands are, in the main, *level*; and that water which runs over them in the form of rivers will run *down* from mountainous inequalities, *on every hand*, towards the *level of the sea.* It is a *fact* that, at the extreme boundaries of man’s travel, the depth of the various oceans has not yet been fathomed; and that the waters may truly be called “*The Mighty Deep!*” It is a *fact*, then, that all we know of Earth is *in* the water and *out of* the water; and that, therefore, St. PETER of old was quite right when he said so. It is a *fact* that lakes and seas and oceans are *all LEVEL*; and that Navigators would as soon think of trying to fly, as of trying to sail over the ocean with a *globe* for their guidance: they must have a chart—that particular chart, *Mercator’s*—which represents the ocean, *not as though it formed part of a globe*, but, as it truly is, a level surface. It is a *fact* that a view of land or water, or both, as seen from a balloon, agrees *perfectly* with the fact that these *are level*; and that one fact will always agree with another fact. It is a *fact* that Dr. Dick, in his work called *The Solar System*, published by the Religious Tract Society, says this:—“In cutting for a canal, in order to have the water on a level, certain allowances require to be made for the earth’s rotundity. The slope requisite to be made on this account is about eight inches in the mile, thirty-two inches in two miles, and so on, increasing as the square of the distance. If the earth were a plane, no allowances of this kind would be requisite, in order that the water in a long canal might stand on a level.” It is a *fact*, however, that surveyors *do not* allow anything for “curvature,” although it is *believed* that they do; that the law steps in and will not *allow it*; and, that, if they *were* to do as Dr. Dick says they do, for a canal twenty miles long, the “allowance” would be *two hundred and sixty-six feet!* It is a *fact* that a vertical line—say, a plumb-line, or, a perpendicular wall of a building,—in any part of the earth, is *parallel* with any other such vertical line in whatever part of the earth it may be situated. It is a *fact* that the compass points Northwards; and that, therefore, the opposite direction, wherever the compass may be, must be South; and that the directions called East and West are but *relative* to North and South, and *not absolute* as they are. It is a *fact* that the part to which the compass points is the *centre* of all the known land or water; and that, therefore, the North is *in* the centre, and the centre is the North. It

is a *fact* that lines radiating from the centre lead to the *circumference*; and, the North being the centre, the South will be the *circumference*, and every part of the *circumference* will be the South. It is a *fact* that, go North or go South, we find enduring snows and unyielding icebergs; and that, but for the absence of the sun's rays, the ice and snow would disappear. It is a *fact* that the North is *inside* the circular path of the sun; and that this path is, nevertheless, *nearer* to the North sometimes than it is at others. It is a *fact* that the South is *outside* of the sun's path; and, yet, that this path is *nearer* to the South sometimes than it is at others. It is a *fact* that, at mid-day, in places near the North, the traveller sees his shadow cast *towards the North*; and that he who goes anywhere towards the Southern *circumference* finds his shadow cast *towards the South*; and, therefore, that the sun's path is *intermedial* in relation to the Northern *centre* and the Southern *circumference*. It is a *fact*, then, that the sun is continually travelling in circles which are *concentric*; that these daily circles increase in size until nearly the end of December, and diminish until nearly the end of June; and, that the times of the Vernal and Autumnal equinox are the times when the sun is travelling in circles of intermediate extent, and when he is, therefore, travelling round over the Equator—his mean path. It is a *fact* that these motions of the sun fully and truly account for the phenomena of Day and Night, and of the yearly Seasons; and, that no description of circumstances *other* than these can possibly do so with even a shadow of consistency or of sense. It is a *fact* that travellers in the North, at certain times, *see* the sun going through the *whole* of his daily horizontal path in the heavens; and that voyagers to the South, see—*nothing of the kind*! It is a *fact* that the North Star is the centre of the circles made by the heavenly bodies; and that no other such centre is known, *although* we are led by astronomers to *believe* that the constellation of the Southern Cross stands in the same relation to the stars at the so-called "South Pole" as the North Star does to the stars at the so-called "North Pole." But, it is a *fact* that the Southern Cross revolves through the heavens as do all the other constellations; and, that this fact alone is sufficient to overthrow the Copernican Theory in the mind of any thinking man. It is a *fact* that this little matter is left by the astronomers, in their published works, almost entirely untouched; and, it is well for *their theory* that it is so. It is a *fact*, however, that Mr. Bain, in *Chambers's Astronomy*, says this:—"We may go on south, . . . till we become convinced "that there is a place in the extreme south end of the earth where the "south pole of the heavens would be in the zenith, and the sphere spin "upright, as at the far north, only with the other end up. This place "is as inaccessible as the other, on account of the cold: but we are sure "that it exists, and it is called the *south pole of the earth*, facing as it does the south pole of the heavens." In this manner, says Mr. Bain, —"the axis of the sphere will get up again: but now the south end, or "the south pole of the heavens, will mount in the sky, and the north "pole descend into the nether unseen regions." So much for Mr. Bain: what for the antidote? It is a *fact* that, since the so-called south pole of the earth *cannot* be seen, and the so-called south pole of the heavens *has not* been seen, and not the smallest indication of it either, it is *too*

outrageous a thing for the common sense of anybody reasonably to entertain for a moment. And it is a *fact* that no heavenly body ever descends into "nether unseen regions; that there are no "nether unseen regions" for it to descend into; and, that no heavenly body ever yet descended below the level of the eye of the spectator, let the spectator be wherever he may please. It is a *fact* that "We see the sun, moon, and stars, every day turning from East to West;" and, also, that they really *do* so. It is a *fact* that sun and moon are "two great lights," and, that they are, also, "to give light upon the earth" which is the only known inhabited world in creation. It is a *fact* that the heavenly bodies shine with their own light; and, that they neither borrow nor lend. It is a *fact* that, whilst there is a great deal that man *does* know concerning the heavenly bodies, there is still a much greater amount which he does *not*; and that it is far wiser to admit his ignorance than it is to assume wisdom he does not possess. It is a *fact* that when the sun is over any meridian, in his daily round, it is twelve o'clock at noon at all places situate on the meridian in question, whether they be to the north or to the south of the sun's place. It is a *fact* that this *Time*, and this natural mode of reckoning it, is sufficient for every purpose of man; and, that there IS but ONE sort of time. It is a *fact* that, in consequence of man's very "cleverness," there are *supposed to be* scores of different sorts of *Time*; and, that a never-ending confusion is the result. *For*, It is a *fact* that there are *Times* based upon the revolutions of the sun, the moon, and of the stars; and, that one sort has been mixed up with another until every possible variety is the result. A volume entitled *A New View of Time*, which was sent forth to the world, anonymously, in 1834, contains a collection of different varieties. It is as follows:—

"Three species of time: solar, lunar, sidereal—from the sun, moon, and stars. The VARIETIES resulting—almost innumerable—certainly very curious: common time, true time, mean time, apparent time, natural time, artificial time, artificial absolute, artificial relative; civil time, common civil; legal time, golden time, bis-sextile; . . . leap time, sidereal-natural, sidereal-artificial; astral; luni-solar, astronomical lunar, civil lunar, common lunar, equinoctial lunar, embolistic lunar, anomalistic lunar; oriental embolistic, intercalary, solar equation time, lunar equation time; true solar time, mean solar time; cycle time, solar cycle time, lunar cycle time, cynic cycle time, anticular cycle time; cusp time, clock time, equinoctial time, precession time, epact time, cycle of epact time; dominical, synodical, tropical, tropical epact, periodical, chronological; rising time, setting time, astronomical, nautical, geographical, planetary; Julian, Gregorian, Dionysian, Ptolemaic, Metonic, Constantinople time, Roman time, indiction, Roman indiction, imperial indiction, eversion; old style, new style, anomalistic time, embolistic, incommensurable, heliocentric, geocentric, zodiacal, zodiacal Egyptian, Egyptian tropical, Egyptian tropical solar, Nabonasserean, Nabonasserean tropical, Nabonasserean tropical epact; yezdegird time, mystical, acronical, acceleration, abbreviation, horizontal, vertical, amplitudinal, rosodic, canicular, Sossoos time; neros, saros; calends, nones, ides; lustrum time; generational time, regnal, canonical, and very many other amusing varieties. Many of them puzzle each other, however; and some actually quarrel with and contradict each other."

Of course, a great many of these "times" are mere *past* times: but, it will be remembered by anyone who has given the least attention to this subject, that a large proportion of the number mentioned are more or less frequently spoken of in astronomical works. Again: It is a *fact* that, if we travel *westerly*, we may be said to "*lose time*;" and, if we travel *easterly*, to "*gain time*;" and, that this is caused, in the first case, by our travelling so as to go *with the sun* in its course, and, in the other case, by our travelling so as to *oppose the sun*, or, to *meet him* in his path.

And—It is a *fact* that we have before us a CHAIN of FACTS long and strong enough, we would imagine, to satisfy any reasonable person that he may hold on by it and not be in danger. Is there such a chain to be found in the domain of *Theoretical Astronomy*?—or could such an one be put together from the materials which *she* furnishes? We answer, most emphatically, No! and we *challenge* the world to produce one.

So much, then, for the *physical* aspect of things relating to *Theoretical Astronomy*—a science which we have fairly and candidly "*Examined*," and earnestly and fearlessly "*Exposed*." There is another aspect of affairs—the *theological*! How long would it take to survey this? Go back to the time when the guardians of our own very Christian Religion took it to be *heretical and damnable* to say that the earth *moved*, in opposition to the Sacred Text; and trace the course of events down to the present time when the guardians of this same Religion cease to trouble themselves at all about it, or else have not faith enough in the Book which they believe to be God's Word to defend it against the assaults of the champions of a speculative science: and we shall form, then, but a faint conception of the duties of the task. We shrink from it. All we shall do is to refer to one or two cases, taken almost at random, of the strange anomaly of professing Christians worshipping *Science* in utter ignorance of its fundamental principles, and ignoring the *Book* which they bind themselves to believe. Who has not heard of *Heaven our Home*?—we mean, the book so called. The author says, "Ask a child "Where is Heaven?" Is there any dimness or doubt existing in the mind whilst giving the answer to your question? No! The finger "is instantly lifted up, and, looking and pointing to the over-arching "sky, the answer is, 'Up there.'" The author then speaks of the change brought about by learning Astronomy! and he asks, Would it be right, when the ideas of childhood are vanished, "hastily to jump to the conclusion that Heaven is nowhere?" "Where, then, is Heaven?" asks the author: and he continues:—"The Bible constantly speaks of it as *up*, as above." . "Take the case of an individual who speaks about "Heaven, and who, in faith, looks up to it at Twelve o'clock in the day. "*Up*, with him, simply means the direction in which he is looking into "the great pavilion of space. . Let twelve hours pass over that individual's head, whilst meanwhile the earth is revolving in its diurnal "motion, and has now brought him into the exactly *opposite* direction, "in reference to that great pavilion, from what he was twelve hours before. Let him now speak of Heaven, and let him look up to it, in "imagination and in faith; his feet are now . towards the Heaven to "which he looked twelve hours before; his head and uplifted eyes are "in the entirely opposite direction. . . Either there must be two "Heavens, or all space is Heaven, or he is mistaken in his view of the "direction in which Heaven lies from him. . . It may be that beyond "all that is visible, and beyond all that is existing in God's lower creation, there lies and there expands and there gleams beneath the light of "God's own manifested presence the Heaven of Heavens, which forms "the *etherealized, luminous, material habitation* in which the children of "God are throughout eternity to dwell."! Suppose, now, we take up the *Christian's Penny Magazine*, for June, 1859, just to see how far off

those objects are *BEYOND* which *Heaven is supposed to be*. *HERSCHEL* is the guiding star; and the "*Astronomical Lessons*" absolutely tell us of "3000" "*universes!*" We read:—"If we estimate our cluster to contain 20,000,000 stars, and each of the other 3,000 clusters to be "no richer, we have spread out before us, in the vast regions of space, "thousands of millions of suns, all the workmanship of our adorable "Creator, and all sustained by His infinite power. The most distant of "these universes appear like faint clouds or patches of light, even when "viewed through the most powerful glasses yet constructed. So far "removed are some of them, that Dr. Nichols estimates their light "—at the amazing velocity of nearly 200,000 miles in a single second, "—would require no less a period than thirty millions of years to reach "the earth!"!! *CHRISTIANS!* Do you know where Heaven is now? *ENGLISHMEN!* Should we fail to *get at you—to lay hold of you*—through means *intellectual, argumentative, iconoclastic*, can we do so through the influence of *Religion*? We care not how it be, so that you do but **THINK FOR YOURSELVES**. *Think* whether you will continue to be the innocent victims of a system of *Theoretical Astronomy* not one step of which has ever yet been proven by any one of its most enthusiastic devotees, or whether you will become the intelligent recipients of a mass of evidence which is incontrovertible and eternal. *Think* whether you will continue to be involved in the meshes of a huge net-work of folly and contradiction and absurdity, or whether you will stand free to roam at pleasure up and down the paths of Truth, fearing no *facts*—afraid of no straightforward language—compelled to use no artifice or sophism or evasive trick. *Think* whether you will teach your children *Theories* which you cannot explain to them, and which cannot be comprehended even by the men who propound them, or whether you will teach your children to lay fast hold of *Facts* which shall be clear to them, and which *they* shall be able to demonstrate to others. *Think* whether you will teach them to *believe*, and to ignore the very existence of their senses, or whether you will teach them to *reason*, and to use the faculties with which they find themselves endowed. And *Think* whether the *Theoretical Astronomy* taught in the Schools of the nineteenth century shall be permitted to go on enslaving the mind and deadening all its powers,—to go on telling her dreams and dealing out her delusions,—to go on pretending to be the legitimate handmaid of *Practical Astronomy* of which we have said nothing and *for* which we *could not say too much*,—to go on leading the people pell-mell into infidelity or unbelief in God or in a Spirit World both which she drives millions of millions of millions of miles from her presence whilst she pretends to be drawing all with her towards them,—and to go on pointing to a Heaven so far from us that none but fools will believe in *such* a Heaven *at all*:—or, whether it were not better to unite to put down, inasmuch as your own words or actions may influence those around you, a system like this; and to hold up a *Philosophy* which has God as the Author of it,—which has Nature always at hand to illustrate it,—Reason, to support it,—the Bible, to agree with it,—and which has "**COMMON SENSE**" to recommend it.

THE END.

William Carpenter, Printer, Greenwich.



MAN'S BEST FOOD.

A REPLY to a Work by Dr. E. LANKESTER, F.R.S., "On Food."

By "COMMON SENSE."

Publisher,—J. BURNS, No. 1, WELLINGTON ROAD, CAMBERWELL.
Price Sixpence.—With Illustrations.

Theoretical Astronomy Examined and Exposed.

By "COMMON SENSE."

CONTENTS OF PART I.

The "Exact" Science of Astronomy... Sun's Distance varied from three-and-a-half Millions to a hundred and four Millions of Miles! ... The Velocity of Light... The Daily Telegraph and the Greenwich Astronomer..... Astronomers' "Corrections"..... Rev. C. Pritchard's advice ... Sound versus Sense..... Mr. Hind's version,—122,000,000 of Miles cut off Neptune's Distance, at one stroke!... "Parallax" ... Rev. R. Main's "Proofs" ... Suppositions... Dr. Lardner and the "Planet" Dr. Lardner's Concave Convexity!... Mr. Glaisher's Balloon "Observation" a flat Contradiction ... R. Burchett, Esq. on the View from a Balloon, &c... Lord Brougham and Sir D. Brewster ... Rev. D. Olmsted :—his ingenuity!... The "Spherical Loadstone"... Supposition and Delusion.

CONTENTS OF PART II.

Galbraith and Houghton's Manual ... What is Theory?... The one thing needful:—simple and direct proof... Figure of the EARTH... The Horizontal Line ... Arguments are useless when based on assumptions..... The Traveller and his money..... Belief versus Knowledge... Dr. Mann... His "Large Round Ball"!... Rev. J. G. Wood... The Boundary of the Sensible Horizon on a Level Plain... Extraordinary Navigation... Reasoning in a Circle... The Fly on the Orange..... Dr. Mann's argument upset... Is there no distinction between "level" and "convex"? ... Mr. Willard... His "Proof" shown to be no Proof—like all the rest Mr. Glaisher's "Observation" Corrected and Remodelled in the Leisure Hour... M. Fontenelle on Hypothesis.....&c.

CONTENTS OF PART III.

The 'onus probandi' on the Astronomers' shoulders..... Is water level, or is it not? Webster's Propositions examined ... What a level surface really is ... An observation by Mr. W. T. Lynn, of Greenwich Observatory..... Ponds, Lakes, and Oceans level..... The "True" and the "Apparent" level of Astronomers..... What is a spherical level?... Its absurdity... Joyce's Scientific Dialogues ... The Reverend gentleman says, the true level is not a straight line, but a curve!... The allowance said to be made by Surveyors... The Cat let out of the Bag... Surveyors' Back and Fore-sight ... A Delusion or a Cheat... The surface of the Earth all top... The new Brass Plate in the wall of Greenwich Observatory ... The STANDING ORDER... One more so-called Proof of Rotundity gone... Excelsior!

CONTENTS OF PART IV.

Sir John Herschel takes the Copernican system "for granted"... A bold step: but a hundred thousand miles!... "Iconoclast" and Mr. Woodman ... Travelling "more than his want of confidence in his own senses" An Astronomical Joke... M. Arago and learns'—The Tailor and his Coat... Sir John Herschel's "Thread" and "Pearls"... The Ones! ... Astronomical Arguments, Schemes, Tricks, and Conclusions..... Mr. Glaisher once more ... Sir John Herschel himself testifies that Astronomy is founded on Imagination... Truth must out sometimes... A Word of Advice, &c.

CONTENTS OF PART V.

Sir Richard Phillips, and Newton's "execrable superstitions" ... Further Examination of Sir John Herschel's celebrated Treatise ... "False and Fanciful Theories" Illustrated... Bradley's Geometry ... The "invisible" and the "imaginary" ... Land is in the Face upon it... What next, and next?... Exeter Hall Lecture on Balloon Experiments ... Sir John Herschel and his "spherical slice"... A little bit of Good Management... The Hay-makers on the Coast of France..... Sir John and his "DATA"..... The Complicated Problem... Sir John and his Arithmetic... His "round" numbers ... Sir John's "rough" result!... The Book of Nature and its Teachings... The Shilling Magazine,—&c.

CONTENTS OF PART VI.

Professor Airy's Six Lectures on Astronomy to Working men... The Earth's motion ... "Do you believe it?" ... Professor Airy's "grounds for the belief"... Likelihood and Probability..... "So much the Worse for the Facts!" Regularity and Punctuality... "Seeming" to Move, and Moving "Sensibly"... "A Strong Proof"... "If the stars be fixed, we move!" ... The Grand FACT, on Professor Airy's own authority... "Why do NOT we turn?" ... Perspective... "Something Curved"... How it is that Ships Circum-navigate the Earth... A CHALLENGE for Professor Airy... The Zenith Sector The way in which it is said to be used, a Delusion or a Fallacy..... The Leak in the Ship of the Astronomer Royal... Absolute and Relative Position... The Sinking of the Ship!

JOB CAUDWELL, 335, STRAND, LONDON.

William Carpenter, Printer, Greenwich.

